US005867950A

United States Patent [19]

Claisse

[11] **Patent Number: 5,867,950**

[45] **Date of Patent: Feb. 9, 1999**

[54] **DEVICE FOR LIFTING A FRAMEWORK, OPTIONALLY TOGETHER WITH A PORTION OF A BUILDING RESTING ON SAID FRAMEWORK**

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[21] Appl. No.: **776,594**

[22] PCT Filed: **Nov. 8, 1996**

[86] PCT No.: **PCT/FR96/01770**

§ 371 Date: **Feb. 18, 1997**

§ 102(e) Date: **Feb. 18, 1997**

[87] PCT Pub. No.: **WO97/19238**

PCT Pub. Date: **May 29, 1997**

[30] **Foreign Application Priority Data**

Nov. 23, 1995 [FR] France 95 13971
Aug. 23, 1996 [FR] France 96 10404

[51] **Int. Cl.**[6] **E02O 35/00**

[52] **U.S. Cl.** **52/125.6**; 52/66; 52/122.1; 52/745.2; 52/749.1

[58] **Field of Search** 52/122.1, 66, 125.6, 52/745.2, 749.1

[56] **References Cited**

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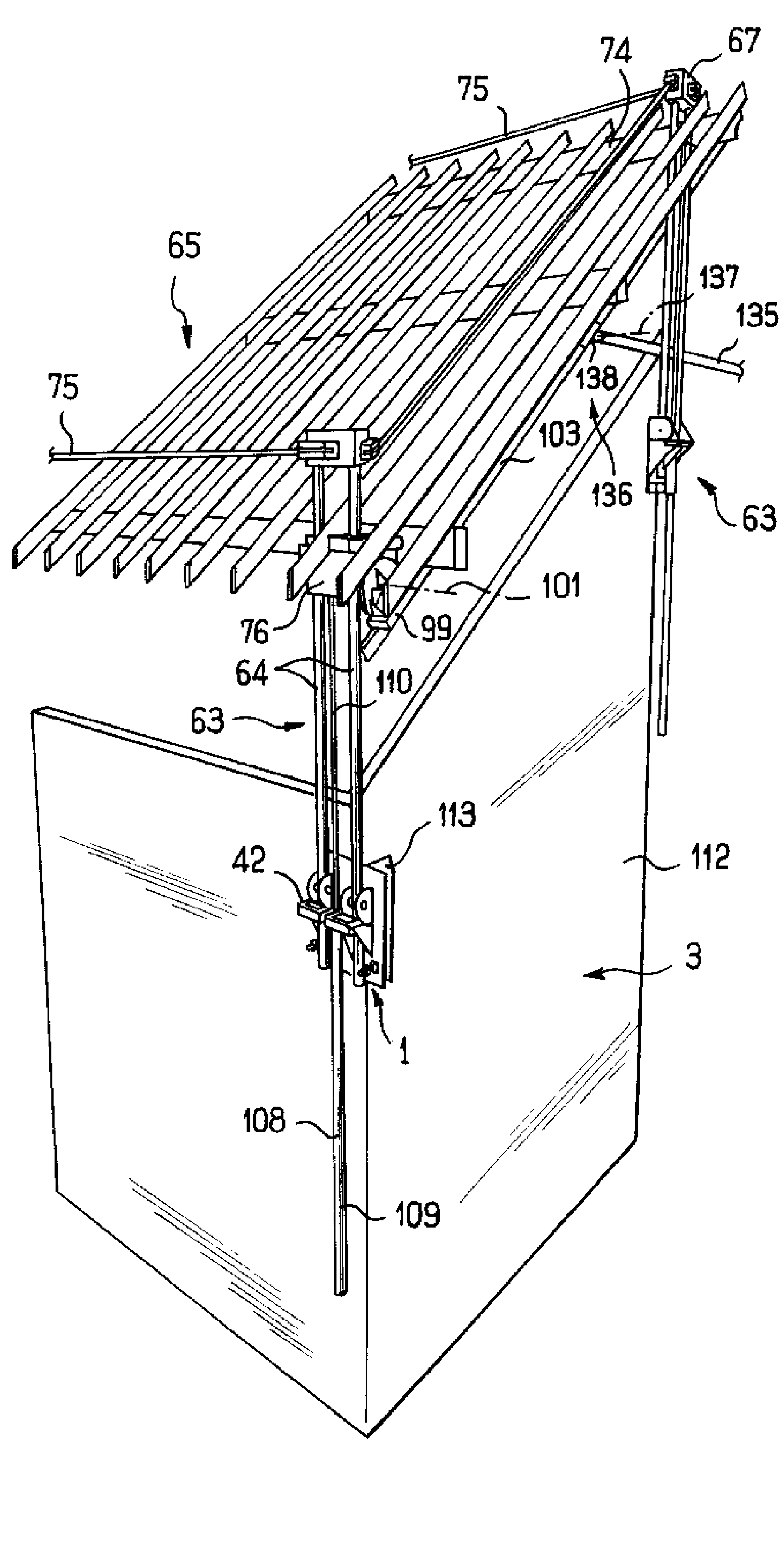
Primary Examiner—Christopher Todd Kent
Attorney, Agent, or Firm—Sixbey, Friedman, Leedom & Ferguson, P.C.; Gerald J. Ferguson, Jr.; Tim L. Brackett, Jr.

[57] **ABSTRACT**

A device for lifting a framework (**65**) optionally together with a portion of a building resting on said framework (**65**), and in particular a roof, relative to underlying walls. The device (**63**) is designed to be used as one of a plurality of such devices distributed around the framework (**65**) and it includes a wall plate (**1**) suitable for being fixed to the wall (**3**) and connected to guides (**64**) for guiding a cursor (**76**) suitable for co-operating with the framework (**65**), and controlled thruster (**108**) for said cursor (**76**) by common connections (**42**) that ensure they are identically oriented. The device is particularly applicable to lifting two-slope or four-slope roofs, or floors, or bare frameworks, by suitable adaptations to the cursor (**76**).

30 Claims, 20 Drawing Sheets



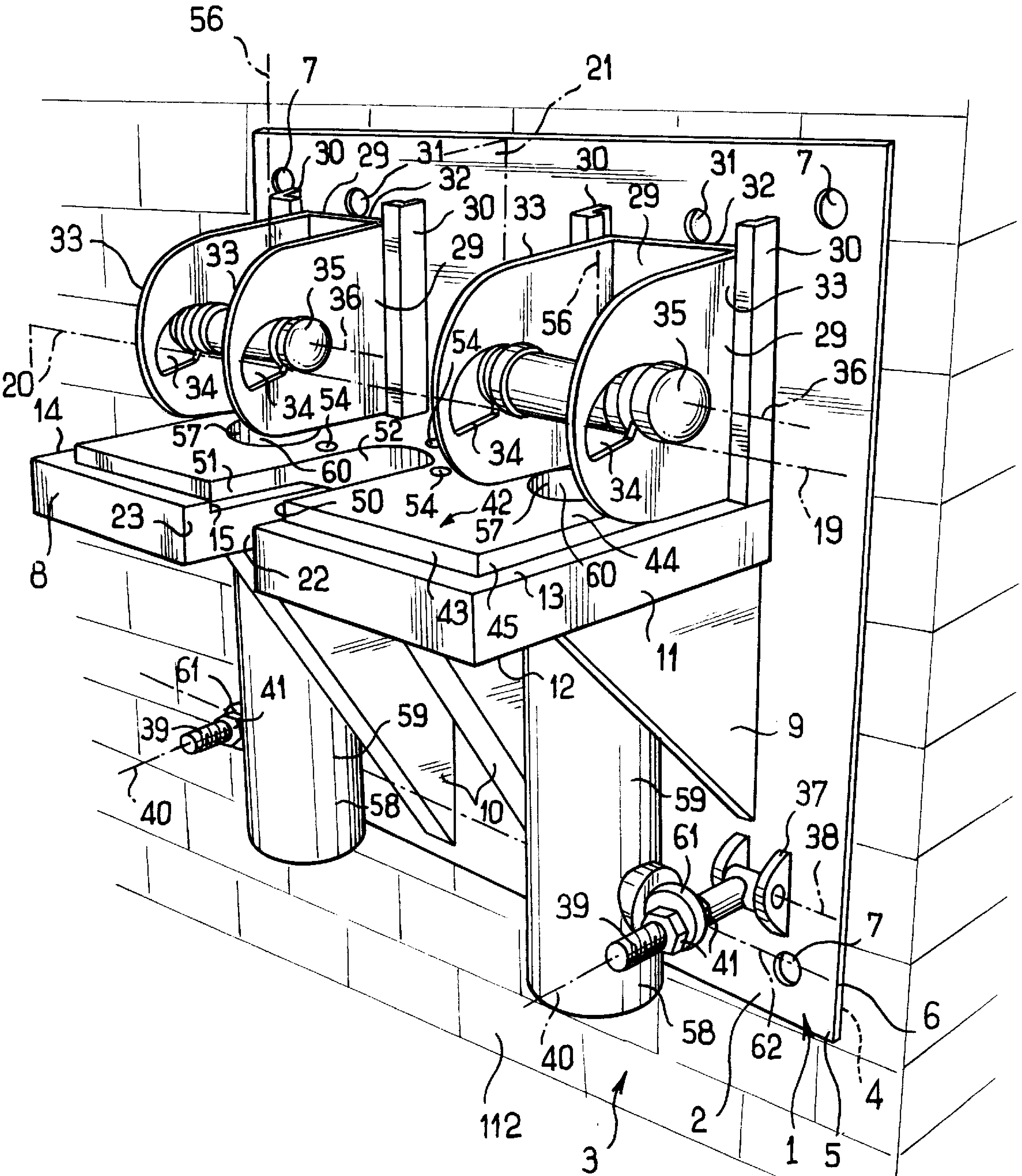

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FIG_1

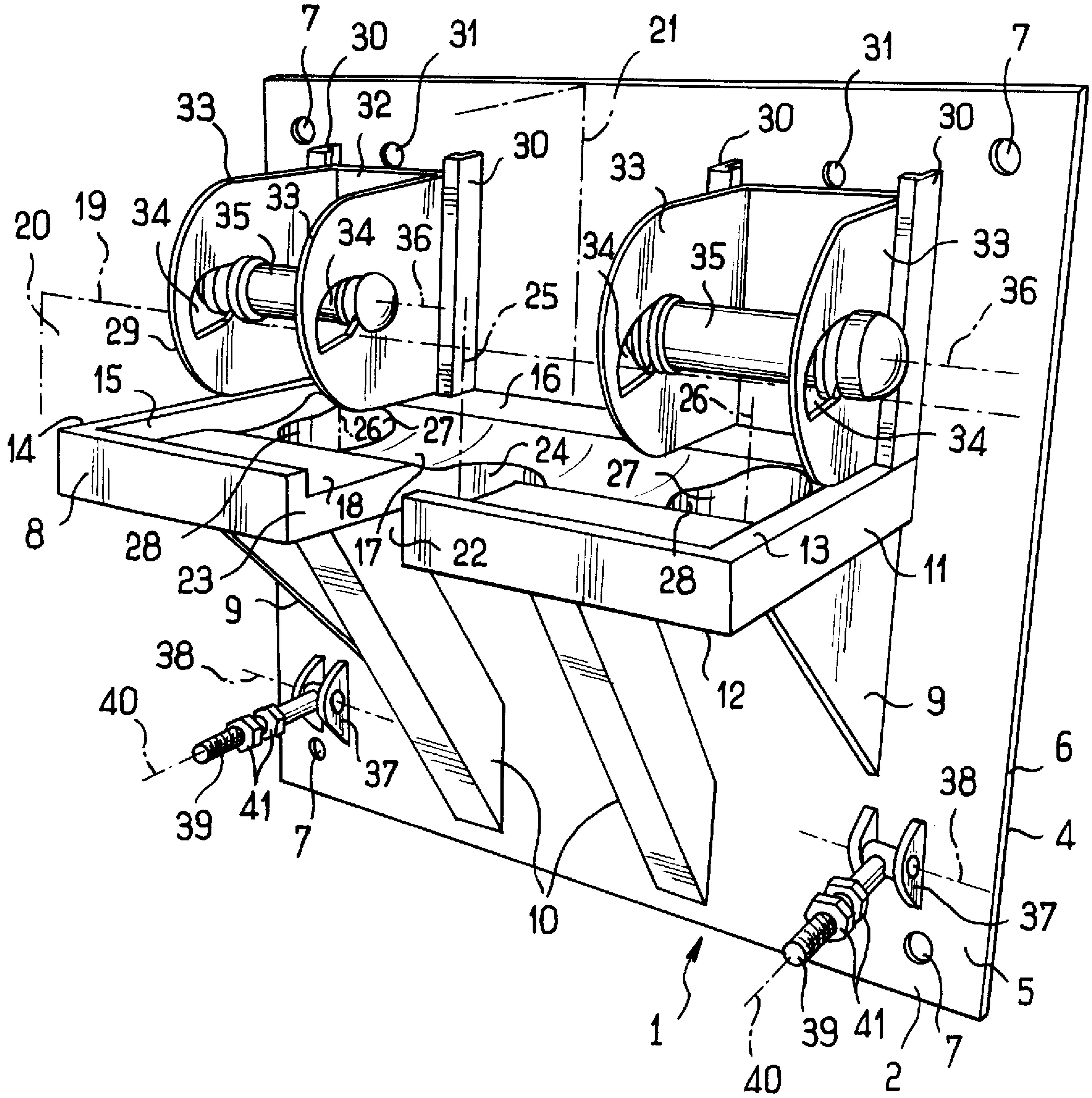
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FIG_2

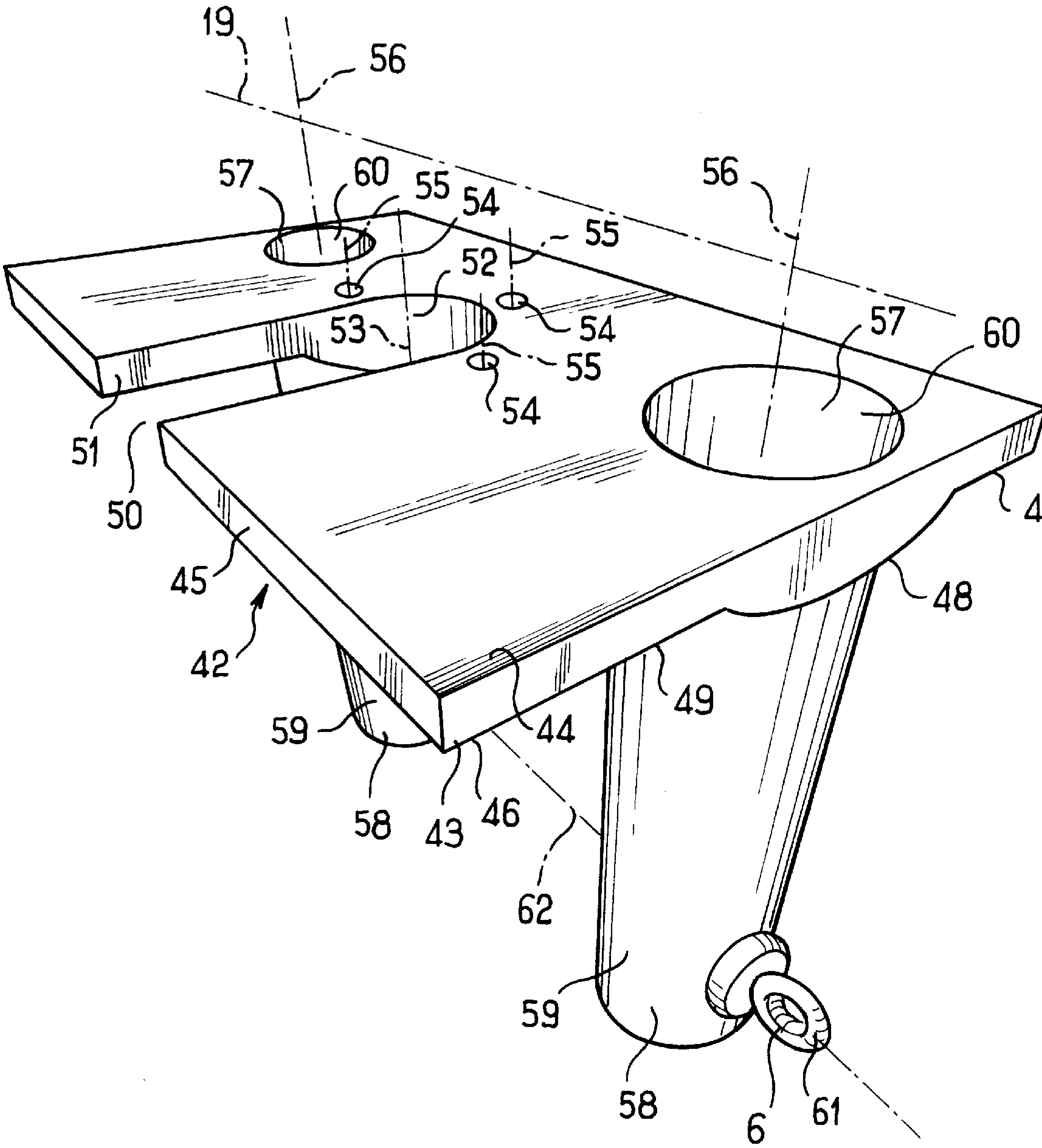
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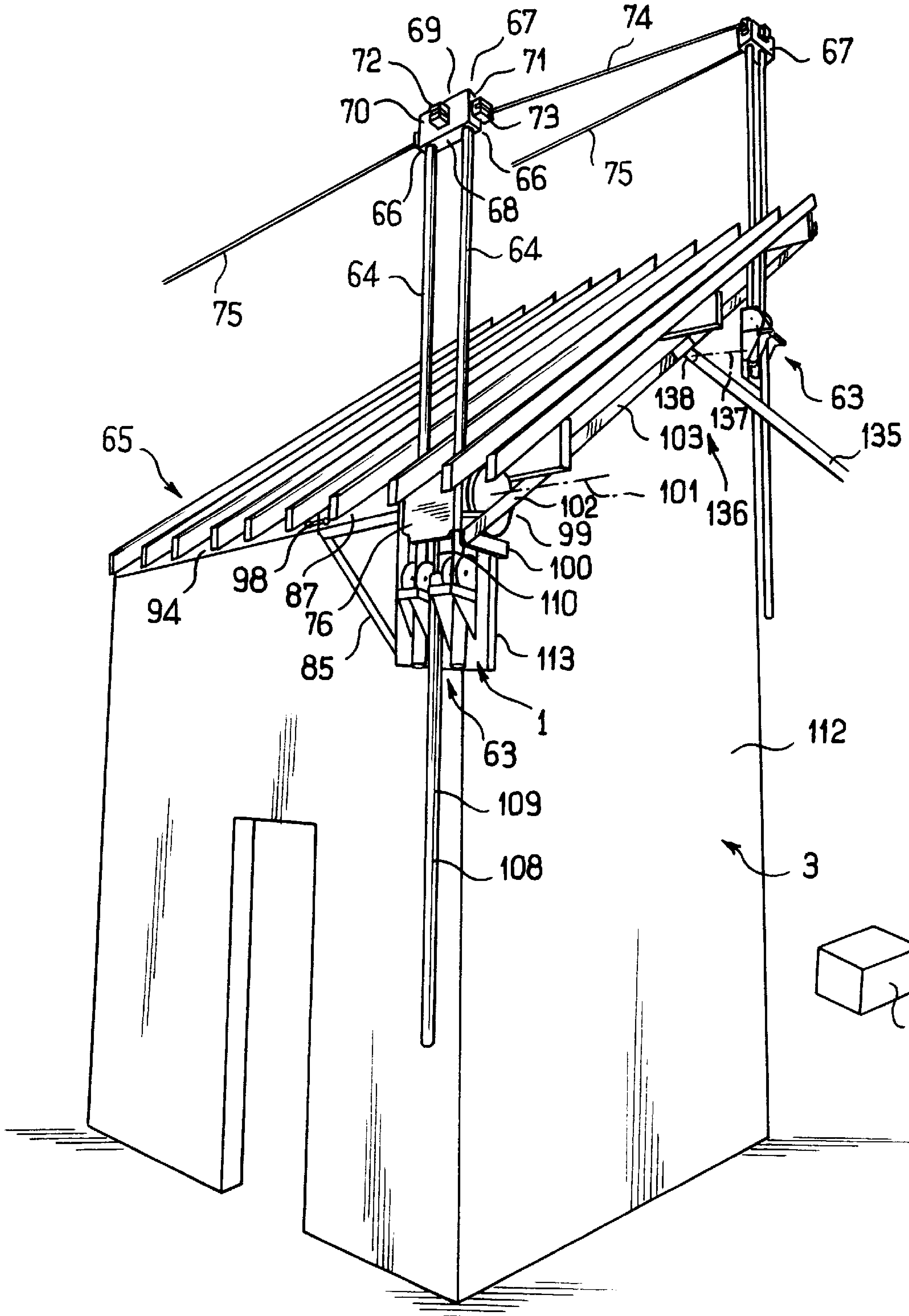
FIG_3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63
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FIG_4

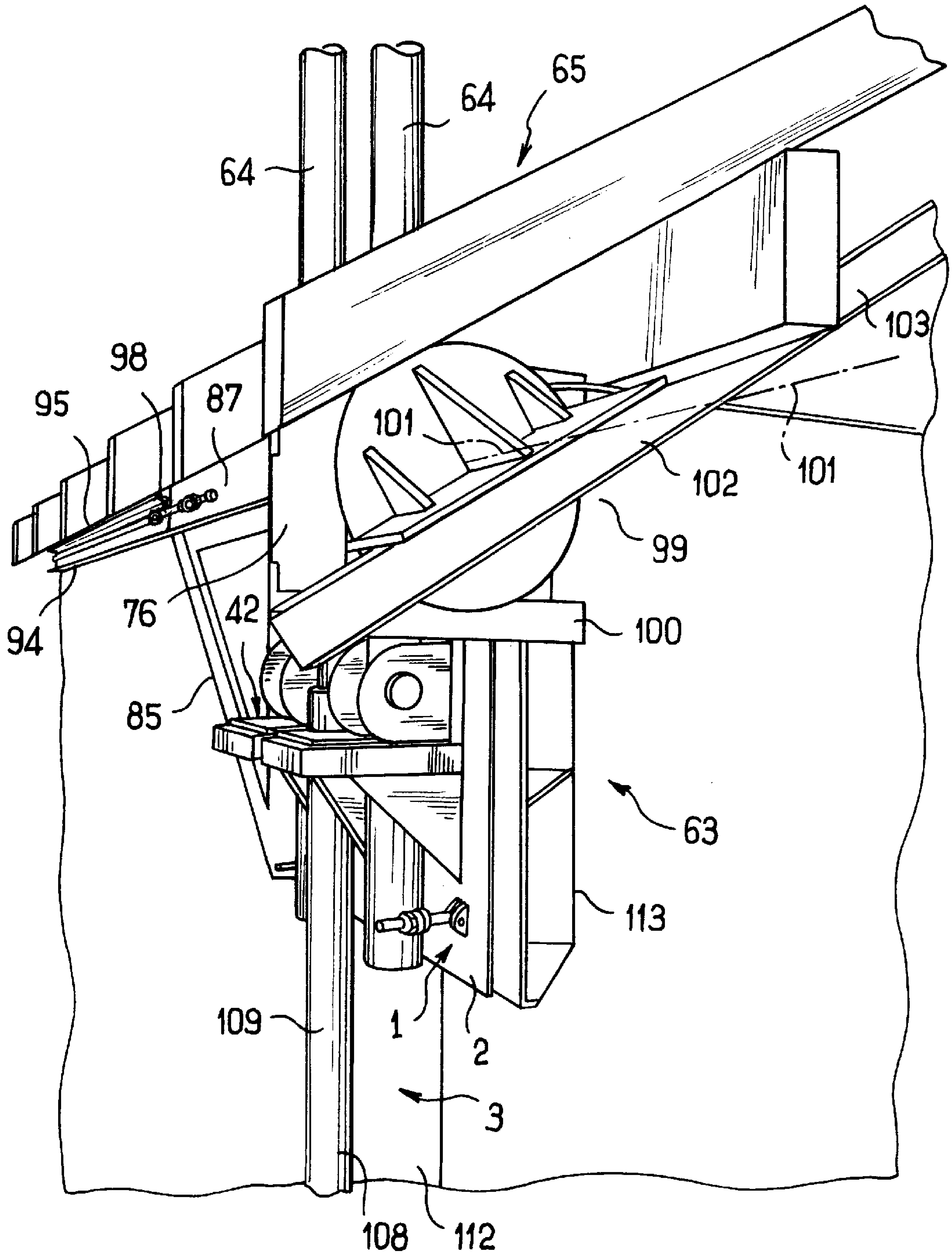
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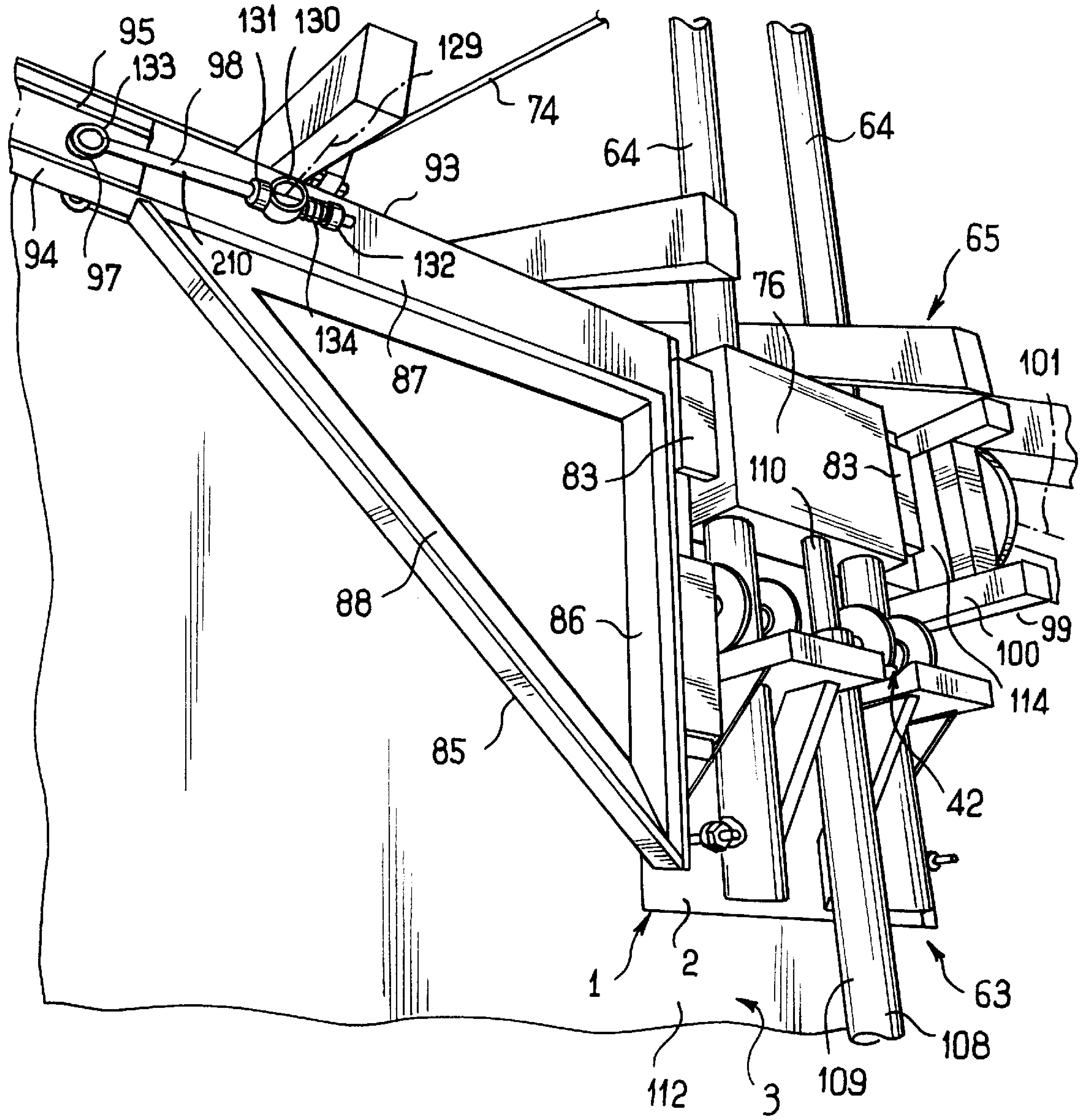
FIG. 5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63
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108

FIG_6

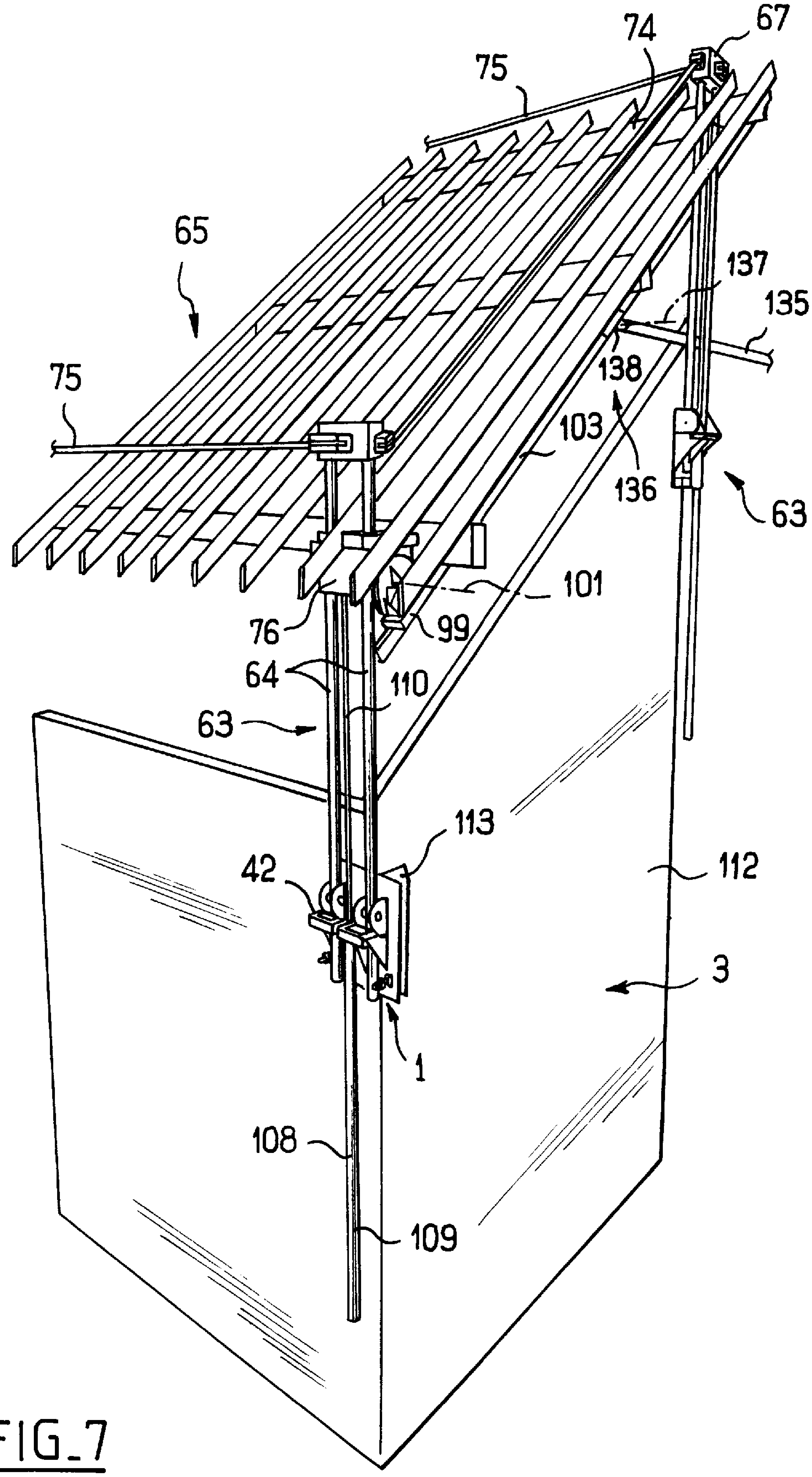
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FIG_7

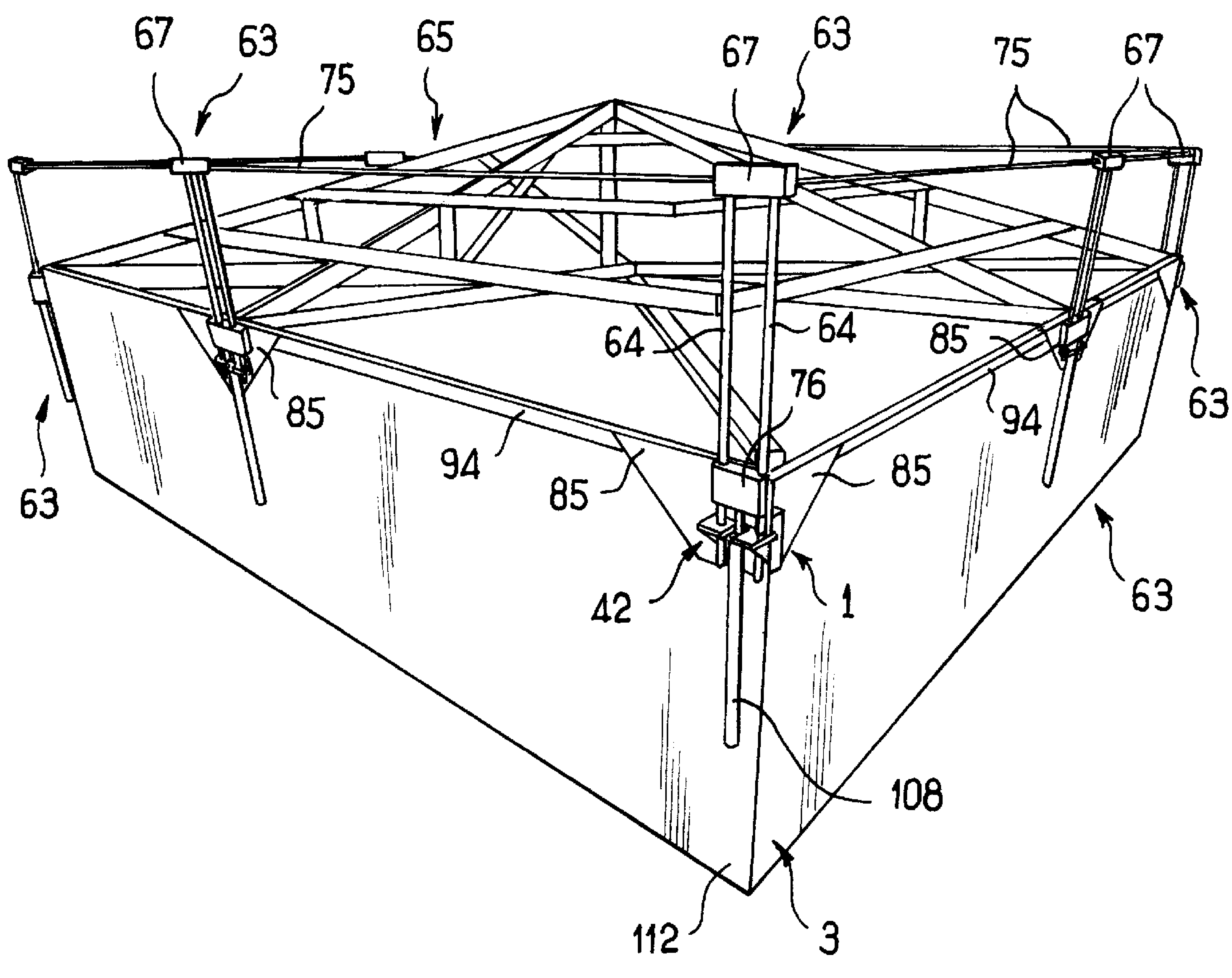
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FIG_8

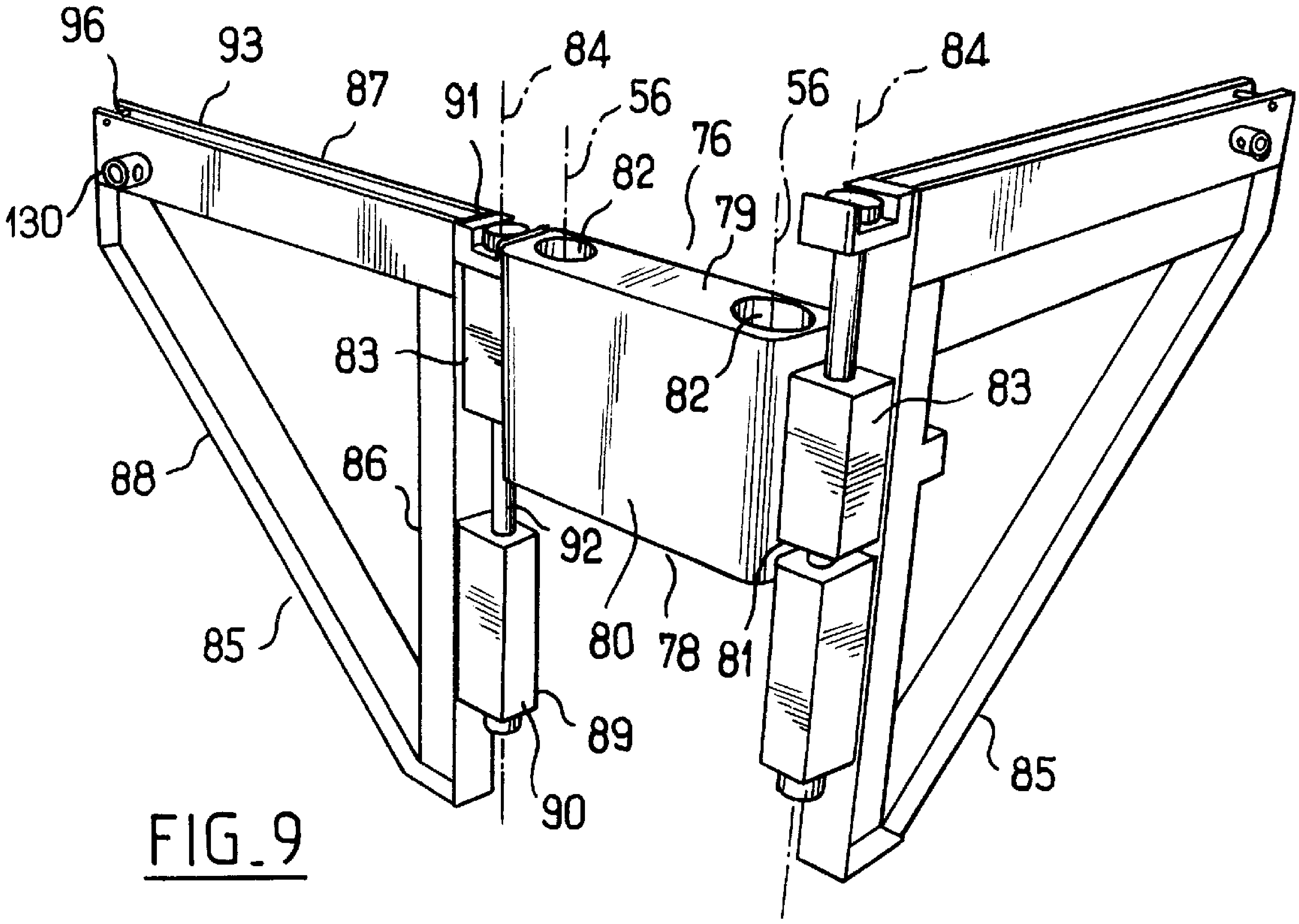
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FIG_9

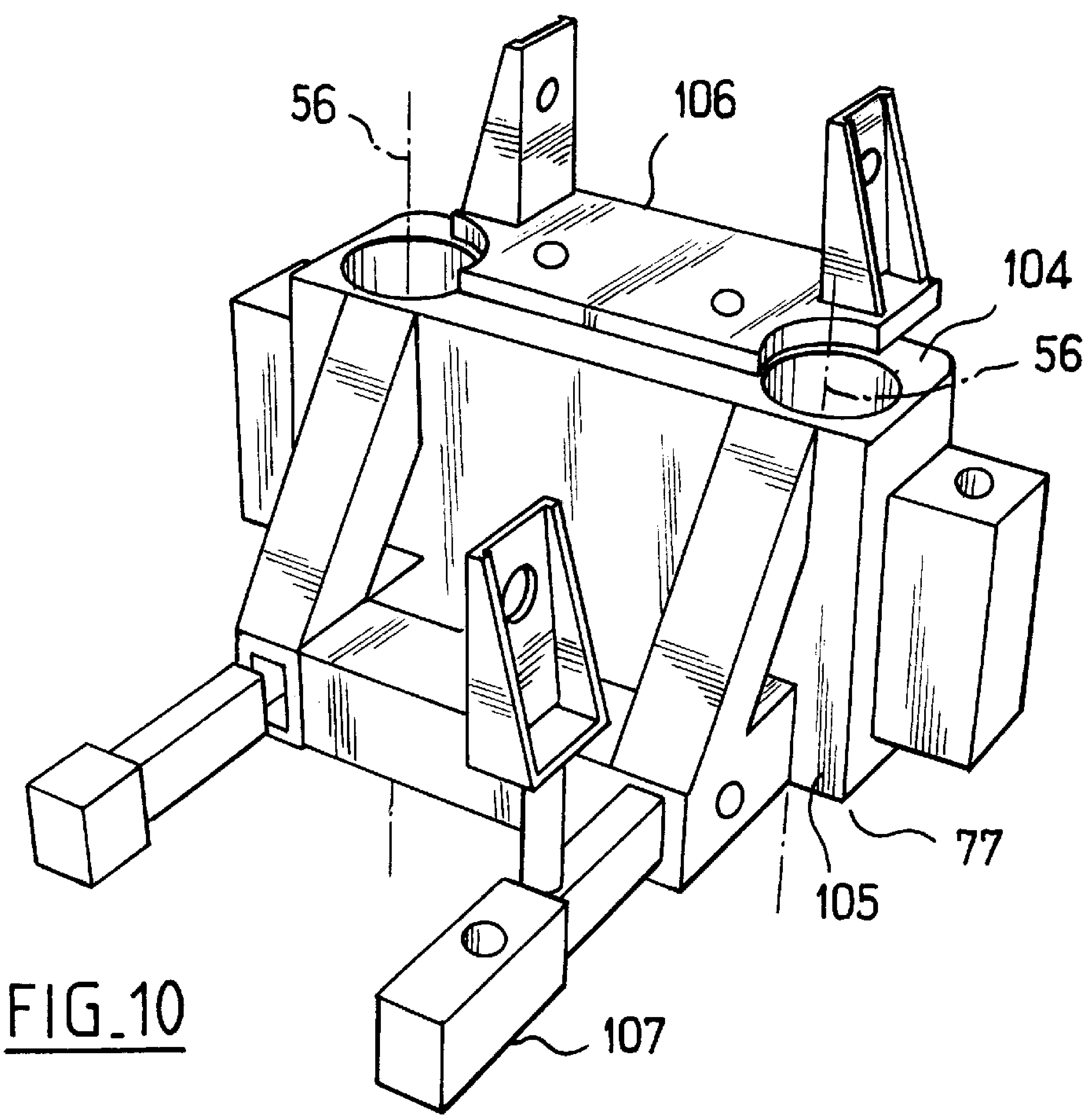
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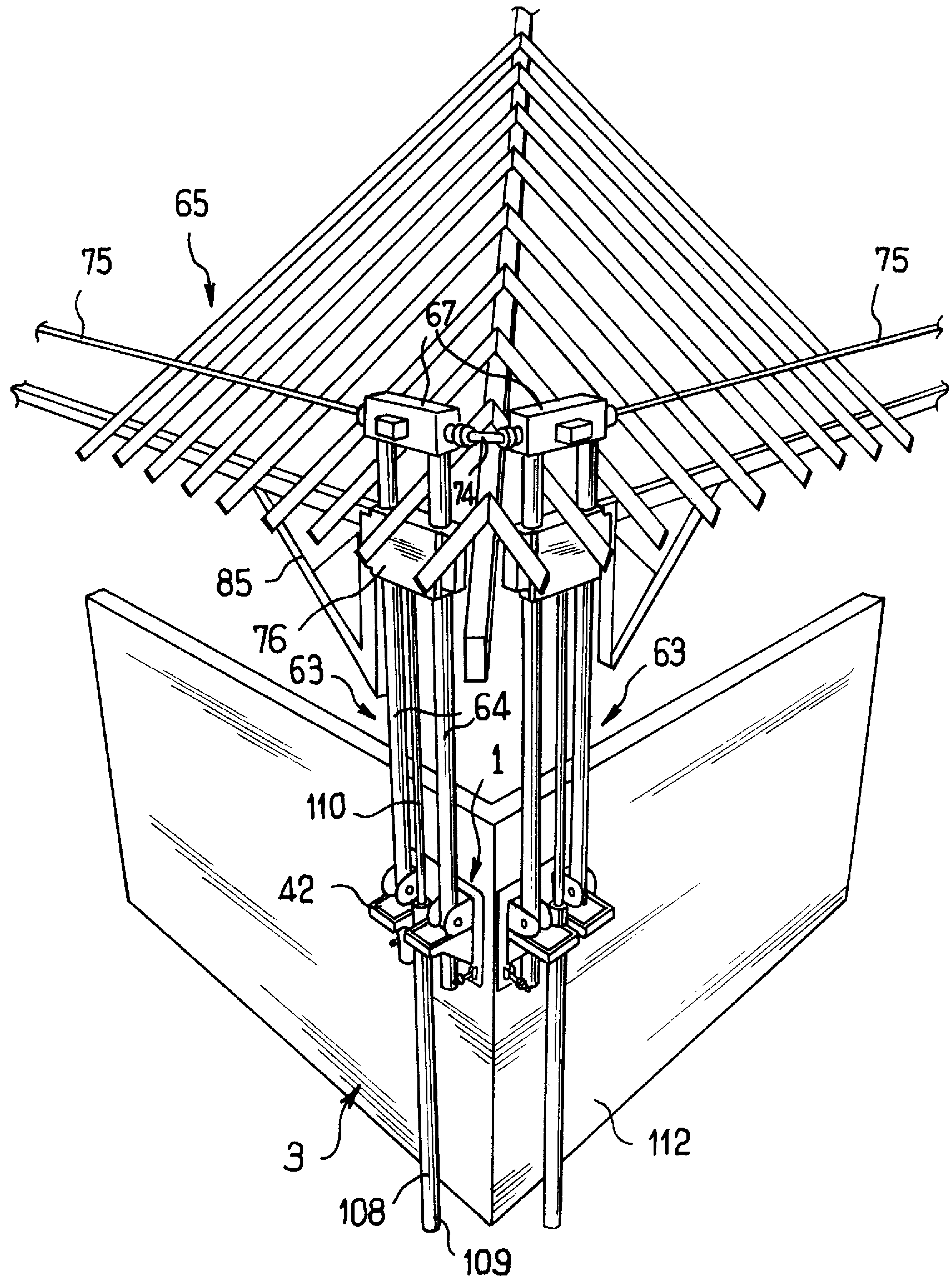
FIG_10



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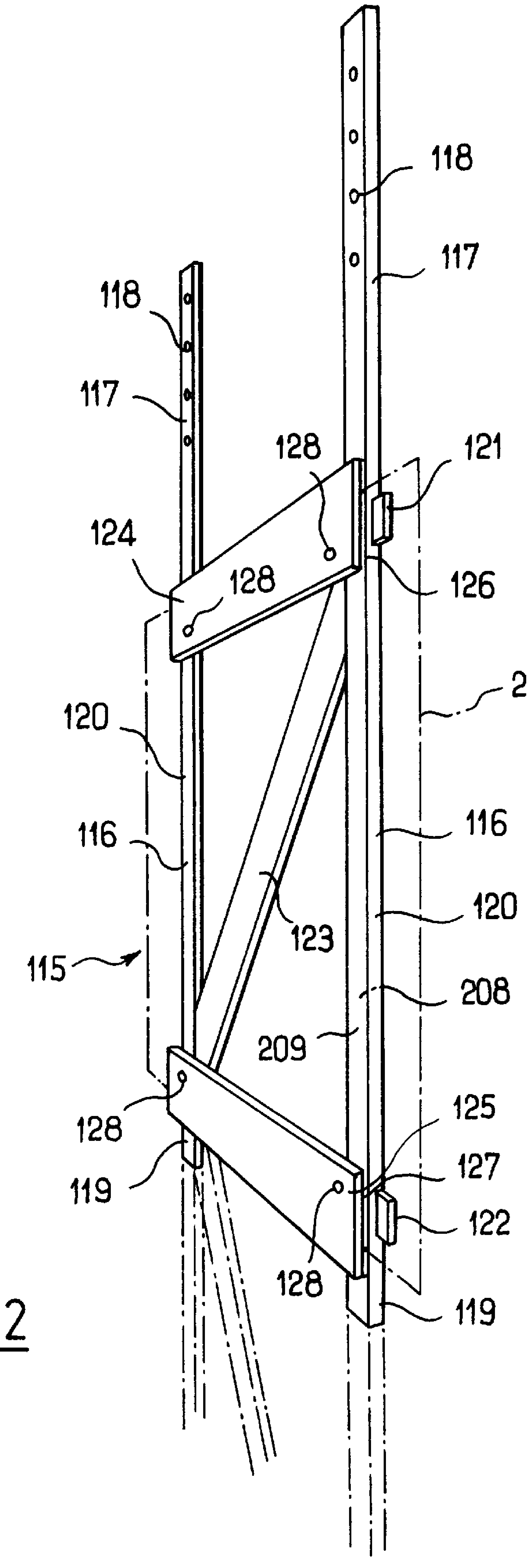
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FIG_12

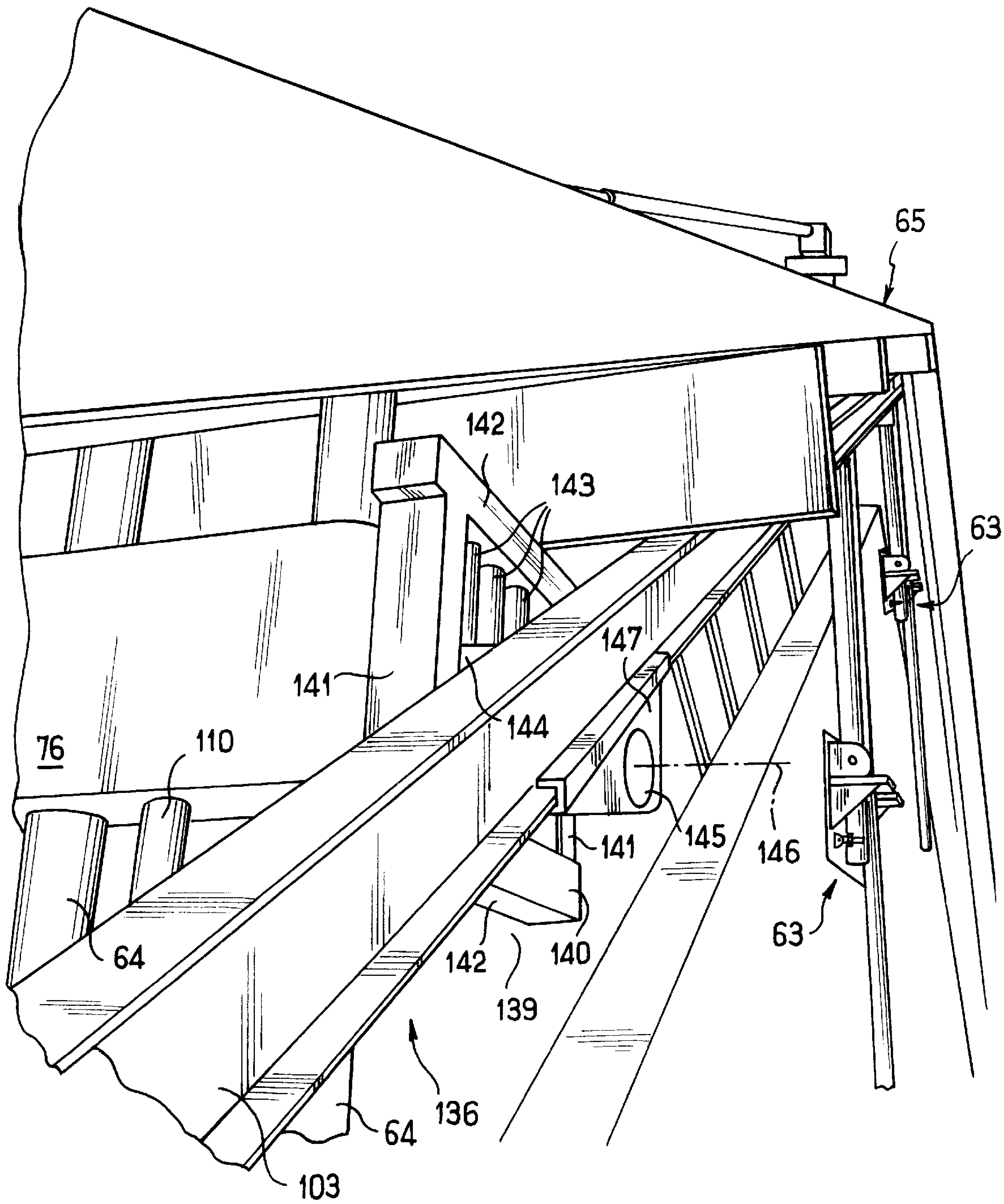
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FIG.13

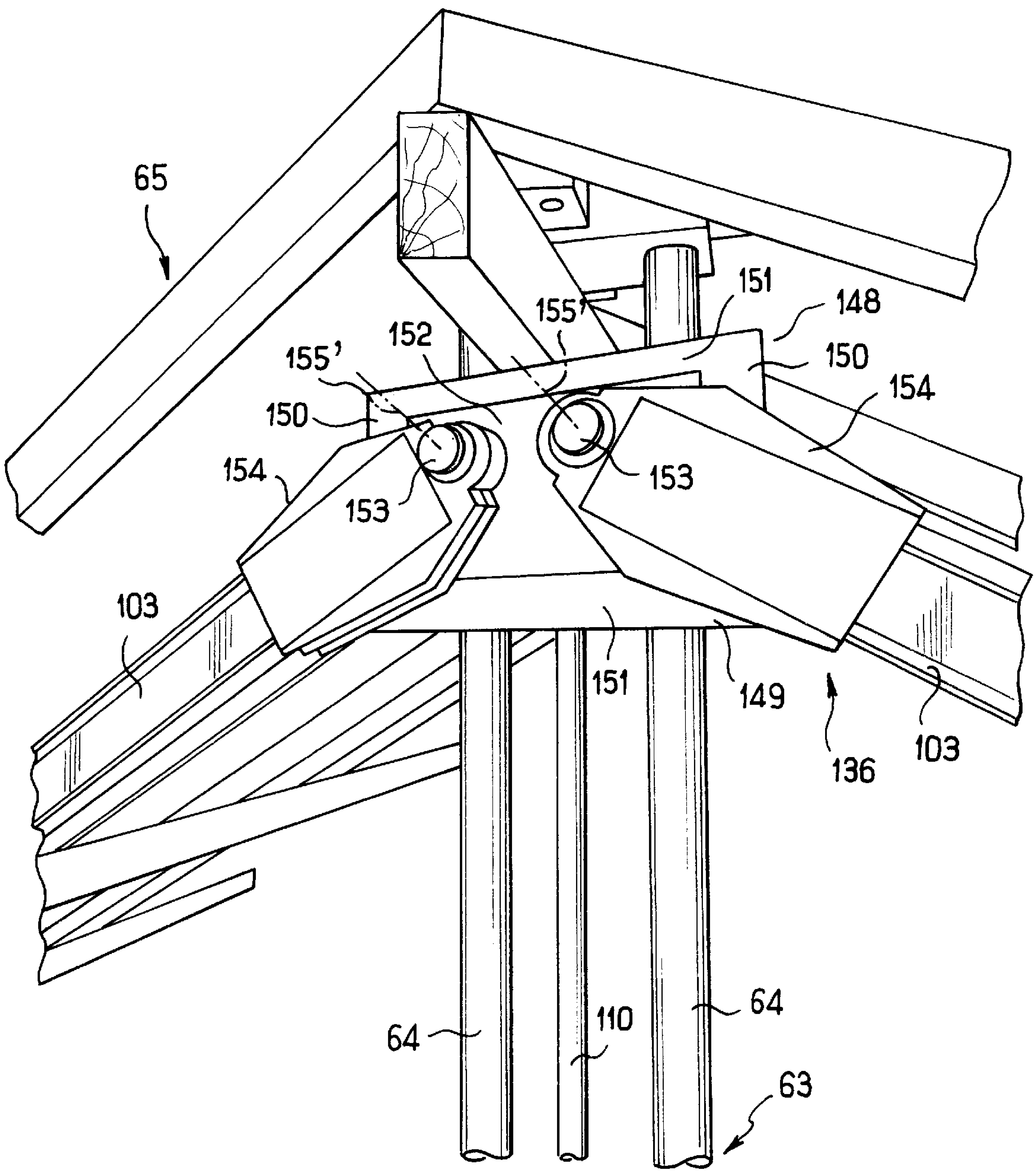
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FIG. 14

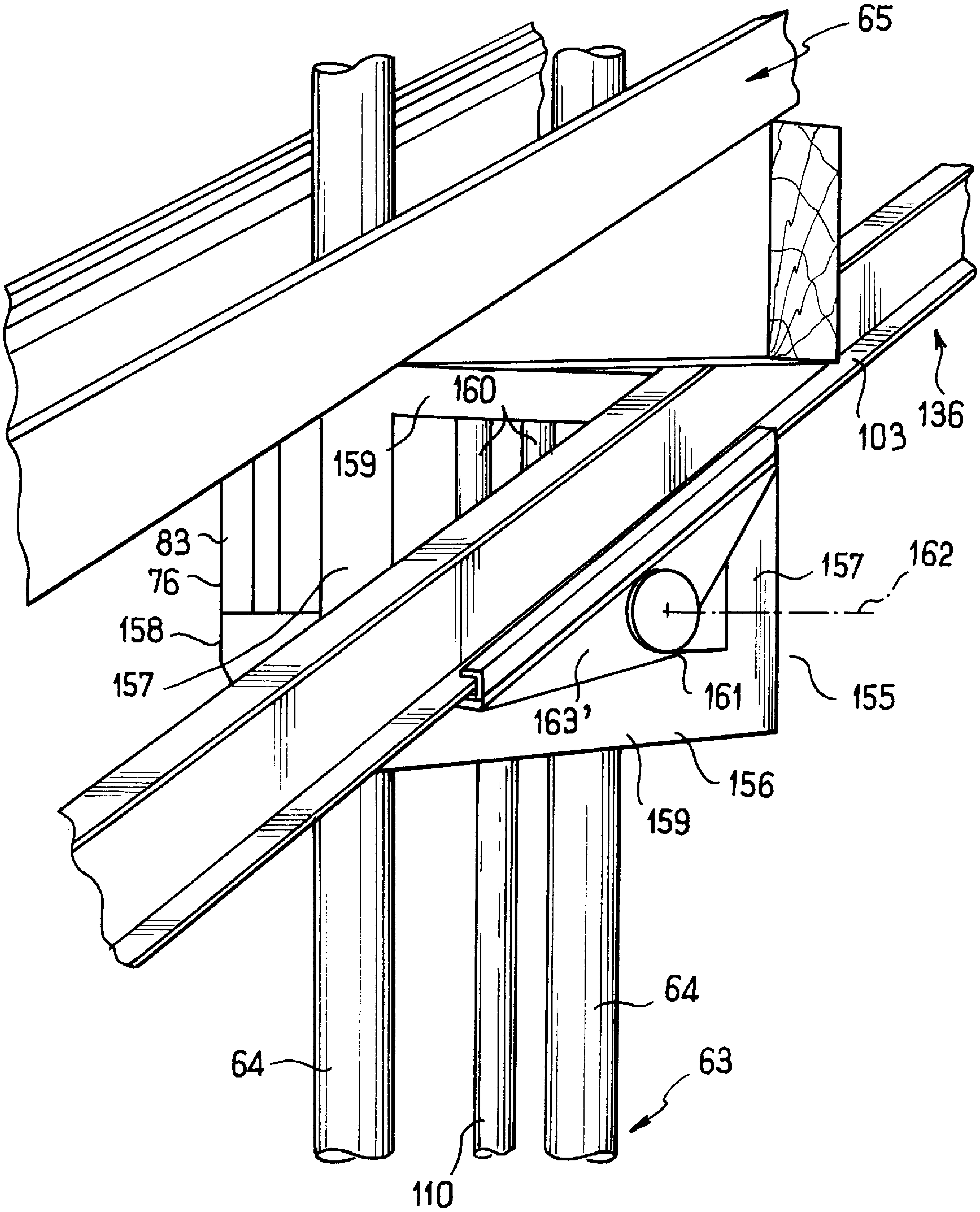
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FIG_15

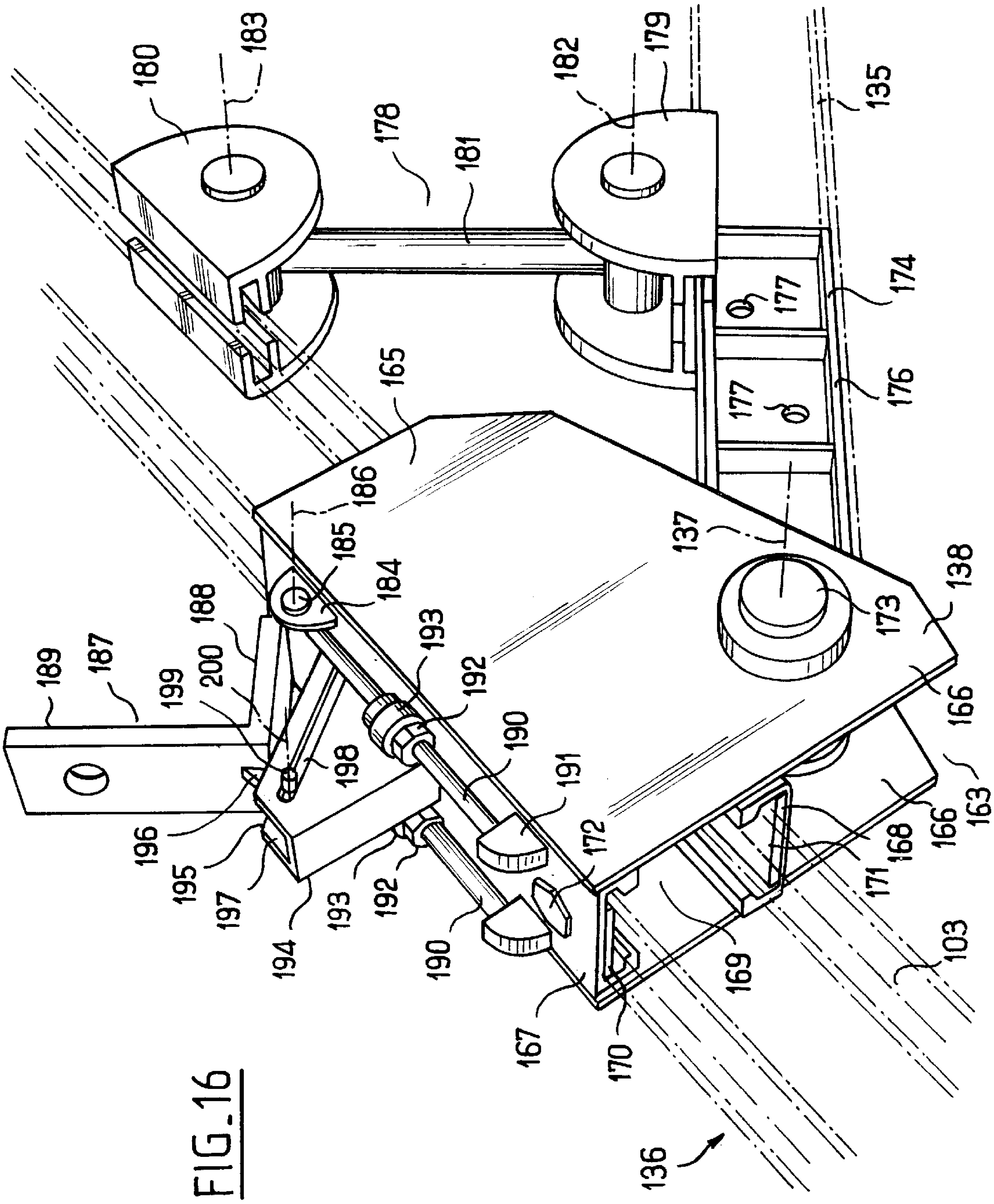
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FIG_16

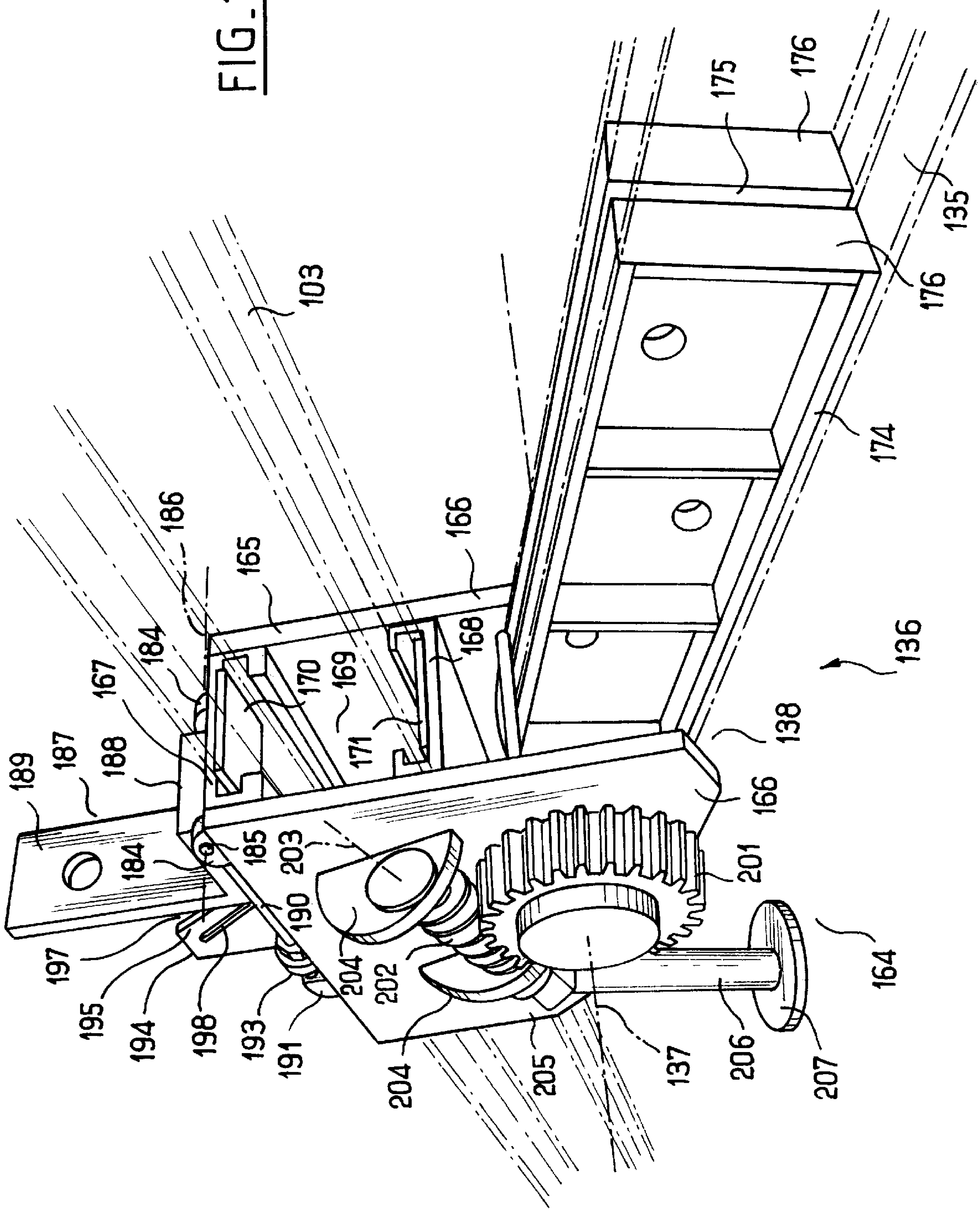
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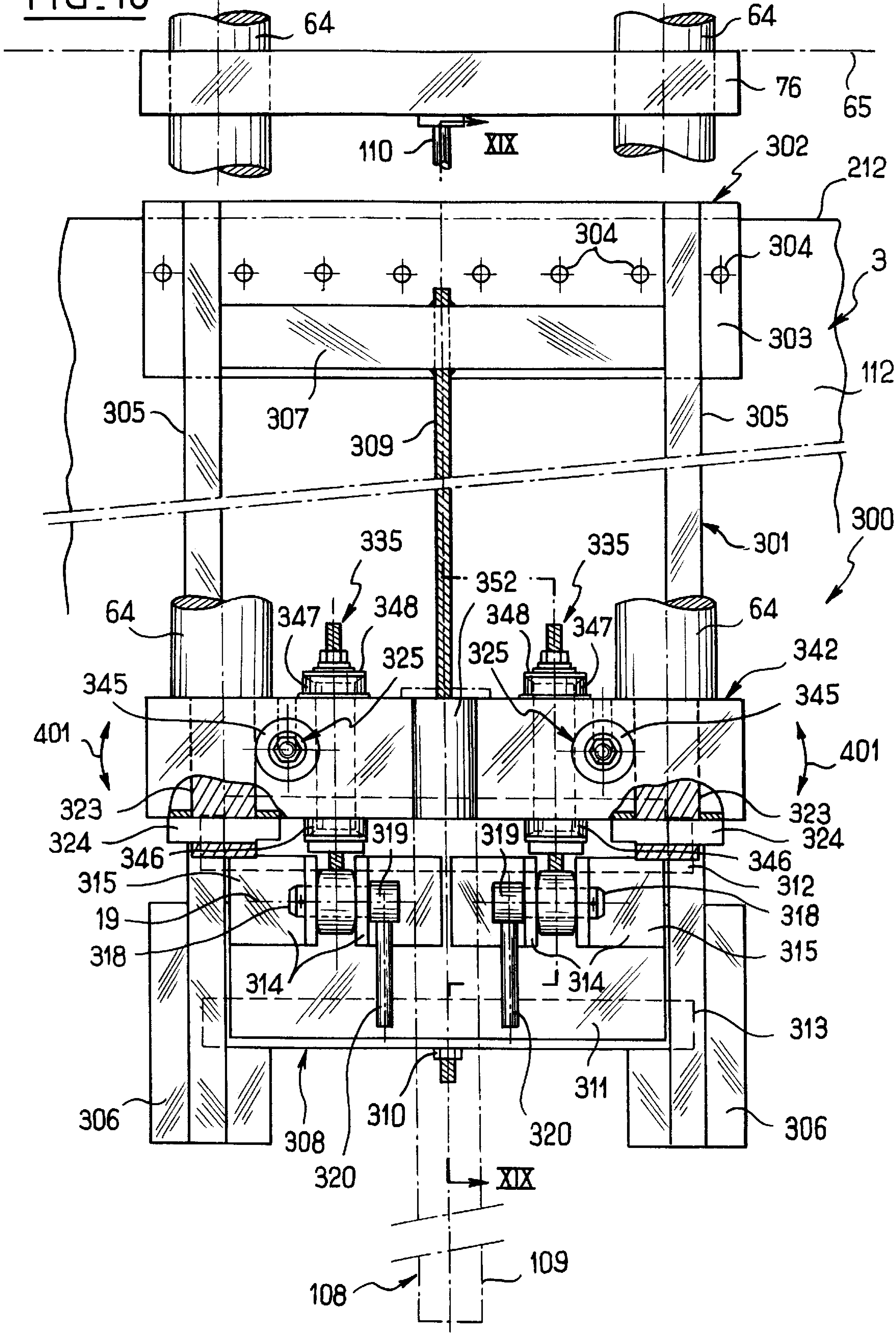
FIG. 17

FIG_18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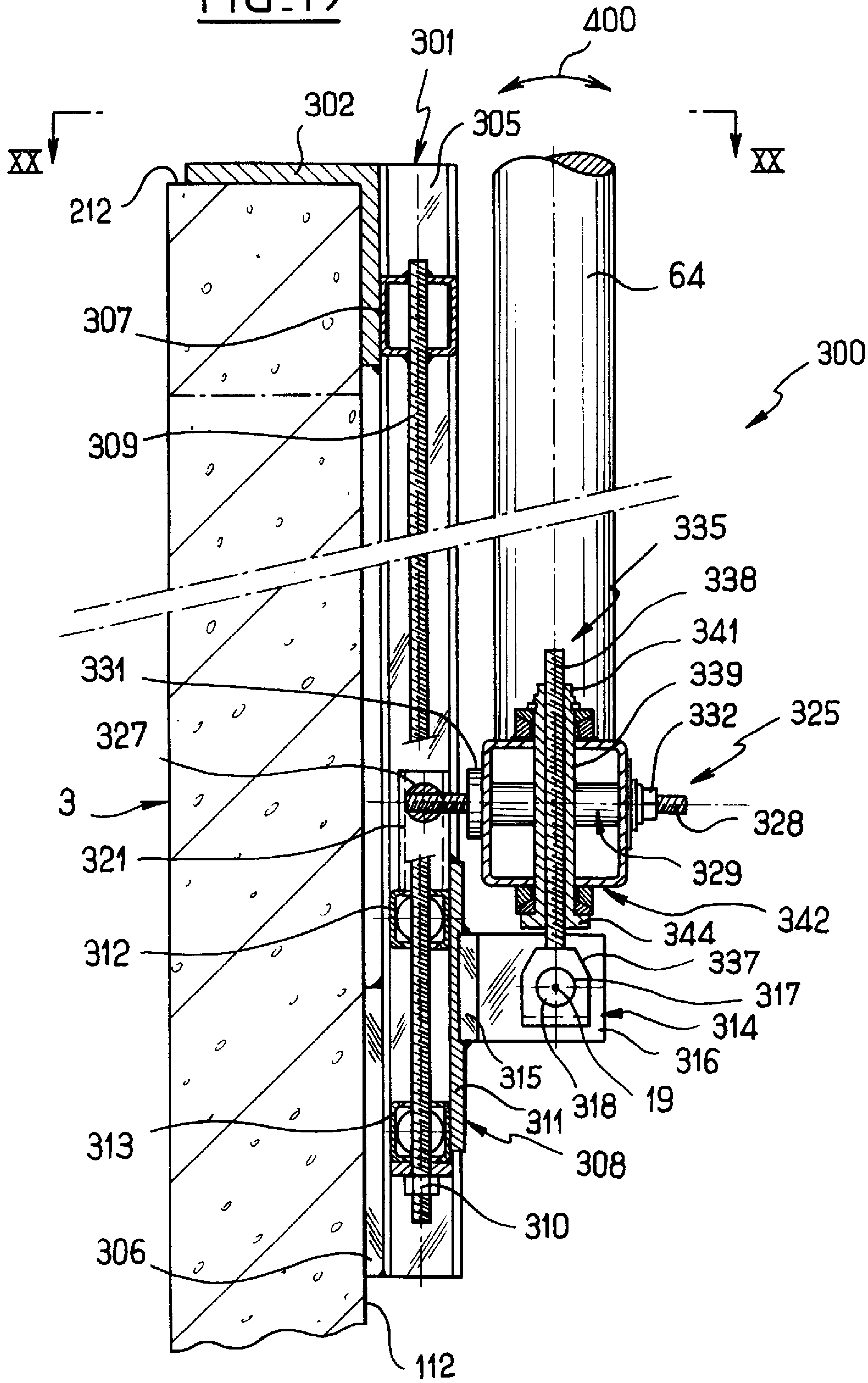
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FIG_20

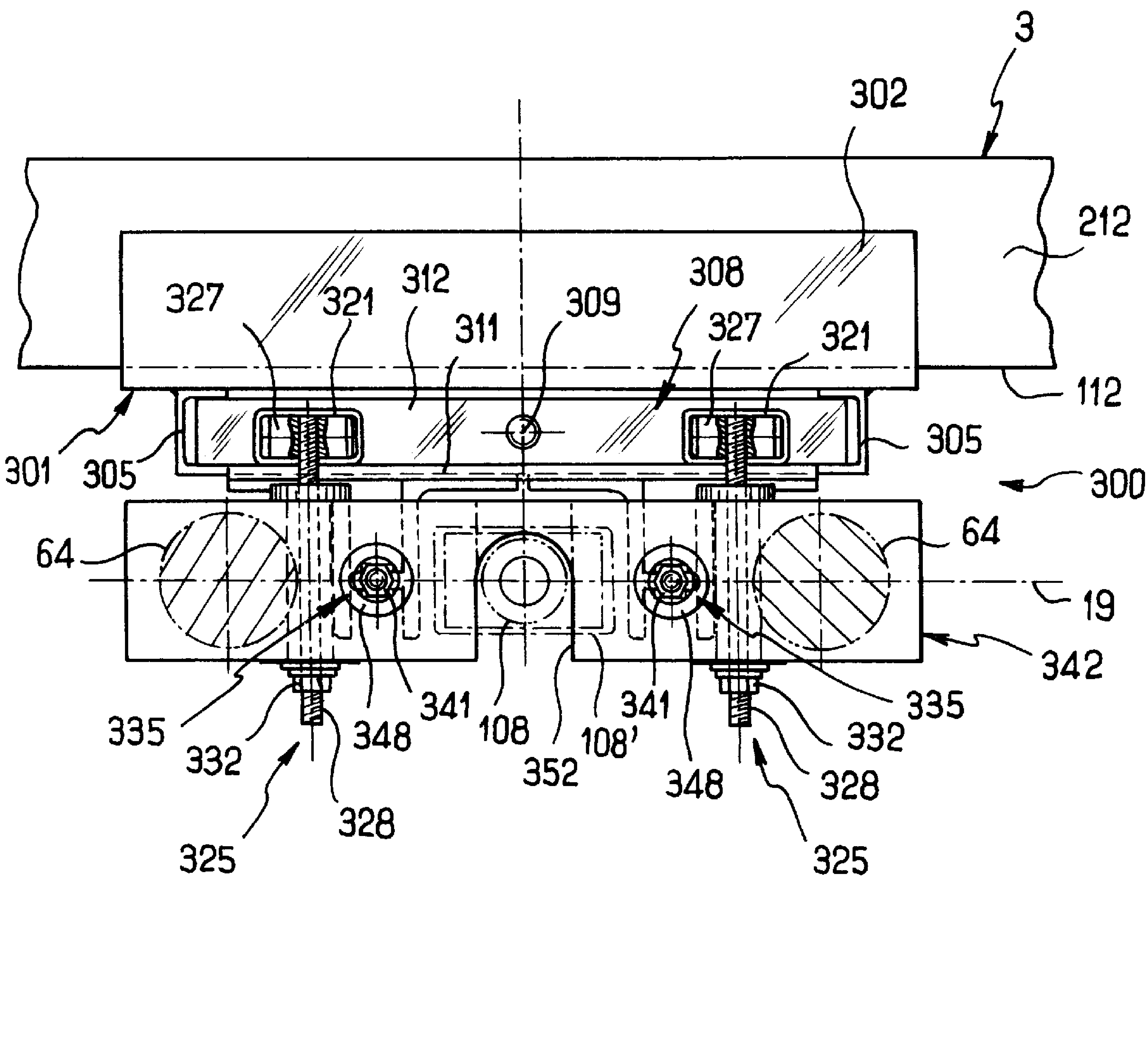
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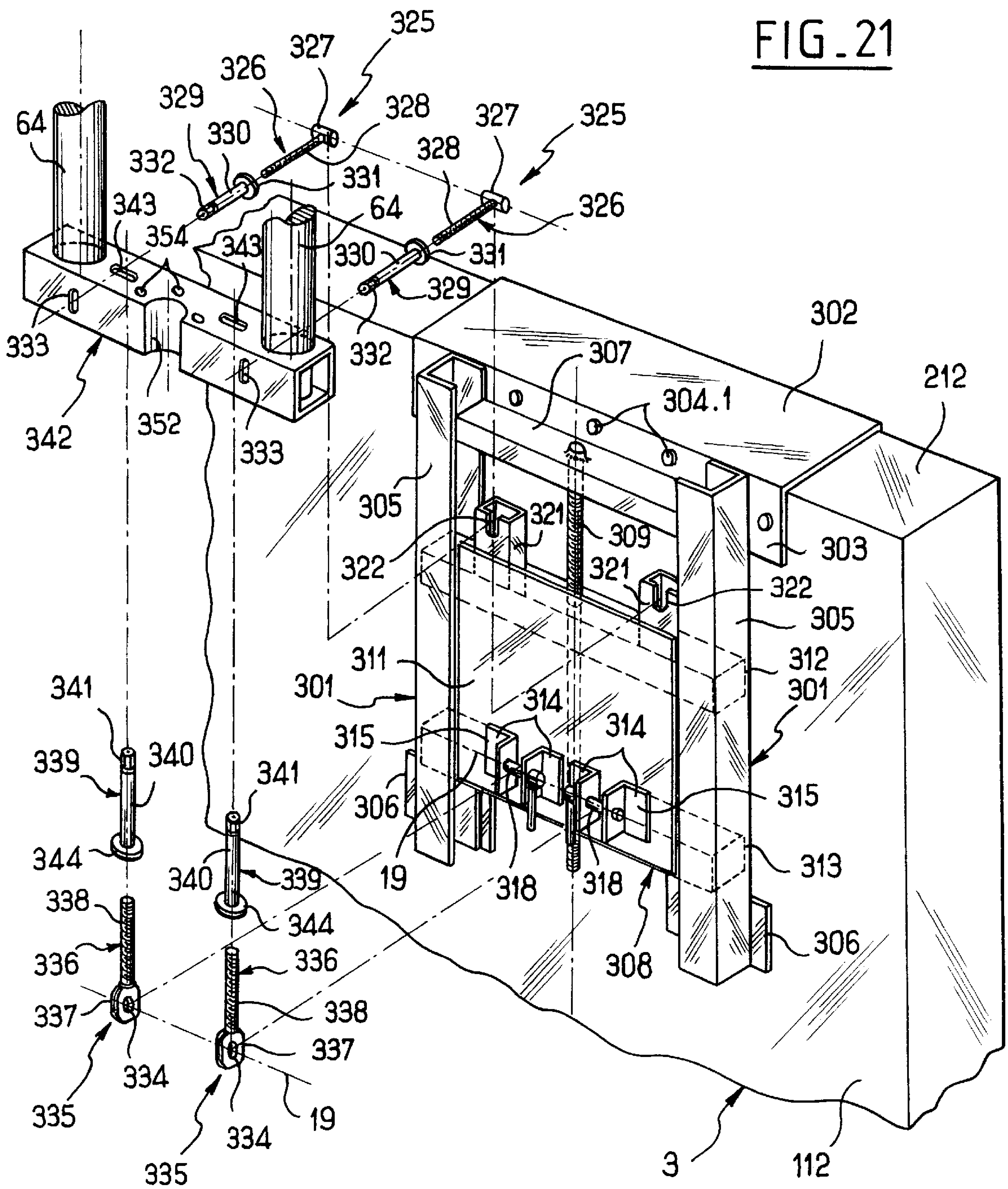
FIG. 21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DEVICE FOR LIFTING A FRAMEWORK, OPTIONALLY TOGETHER WITH A PORTION OF A BUILDING RESTING ON SAID FRAMEWORK

The present invention relates to a device for lifting a framework, optionally together with a portion of a building resting on said framework, and in particular a roof, relative to underlying walls, by using a plurality of such devices distributed around the framework.

BACKGROUND OF THE INVENTION

Lifting devices that are supported either on the ground surrounding the building whose roof is to be lifted, or that are supported on a floor or story of the building are already known. For example, reference may be made to documents WO-A-94 11596 and FR-A-2 540 543 which describe lifting devices using jacks supported on a floor of the building whose roof is to be raised. Reference may also be made to document U.S. Pat. No. 4,980,999 which describes a lifting device supported on the surrounding ground, and constituted either by lifting towers incorporating winch systems, or else by jacks mounted on a support itself standing on the ground.

Those known devices are not organized to be capable of being fixed to the surface of a wall, and in addition their structure is extremely bulky, thus giving rise to high manufacturing cost.

Document FR-A-2 720 430 in the name of the Applicant and published on Dec. 1, 1995, describes a lifting device of the above type, and comprising:

- support means suitable for being fixed to a substantially vertical surface of a wall, in particular an outside surface thereof;
- a cursor suitable for being placed substantially vertically above the support means and for co-operating with an element of the framework resting thereon;
- guide means for guiding the cursor in translation relative to the support means, in a direction that is capable of being oriented substantially vertically; and
- in an application to lifting a roof, and in an embodiment in which the support means are constituted by three distinct wall plates that are fixed independently of one another to the wall, comprising a low plate serving as a support for a jack constituting the controlled thrust means, and a high plate and an intermediate plate co-operating with stanchions carrying the cursor for the purpose of constituting guide means therefor.

That embodiment of a device for lifting a roof suffers from the drawback of being complex, expensive to manufacture, lengthy and fiddly for fixing to and adjusting on the surface of a wall, lengthy to dismantle after the roof has been lifted to the desired level and the wall has been built up to the roof lifted in this way, and it is particularly detrimental to the appearance of the wall since it is necessary to drill numerous holes therein for fixing the various plates.

OBJECTS AND SUMMARY OF THE INVENTION

An object of the present invention is to remedy those drawbacks and, to this end, the present invention provides a device of the type specified in the preamble, characterized in that the support means include a wall plate common to the guide means and to the controlled thrust means, and common connection means for connecting the guide means and the controlled thrust means with the wall plate, ensuring identical orientation therefor.

By designing the support means in this way, using only one wall plate, installing, adjusting, and then removing the device is much easier and much quicker, and the device leaves fewer unsightly marks after it has been removed, thus reducing the amount of work involved in making a preexisting wall presentable again. In addition, the device is suitable for being implemented in a manner that is particularly simple and cheap, as will appear clearly to a person skilled in the art from the description below.

Such a person skilled in the art will also readily understand that a device of the invention can be used for lifting any type of framework, which may possibly be bare, but which will usually be carrying a portion of a building, generally constituted by a roof as described in the above-mentioned French patent application, but which could also be constituted by some other component of a building, such as a floor, in which case the term "lifting" should be understood broadly, implying not only moving in an upwards direction but including moving downwards. Naturally, the sites on the vertical wall surface to which the wall plates of the various devices of the invention are to be fixed will be selected as a function of the nature of the framework and the portion of the building that it carries, with an outside surface usually being selected for a roof and an inside surface for a floor.

When the term "adjustment" is used herein, the adjustment essentially intended herein is such that the orientation of the guide means and of the controlled thrust means is identical for all of the lifting devices engaging the same framework, which is essential for preventing any tendency of the cursors to move towards one another or apart while lifting is taking place, which would impose stresses on the framework that could cause it to be destroyed, or else that could cause some of the lifting devices to be destroyed.

It is possible for such adjustment to be performed solely while the plate is being fixed to the supporting wall by adjusting the positioning of the wall plate relative to the wall, however, it is preferable to use an embodiment of the invention in which the connection means include means for adjusting said identical orientation.

For example, for this purpose, the connection means include a holding tray for holding the guide means and the controlled thrust means in an identical orientation, and hinge means for hinging the holding tray relative to the wall plate about an axis suitable for being disposed substantially horizontally and substantially parallel to said surface, and preferably, temporary immobilization means for immobilizing the holding tray relative to the wall plate within a determined range of relative angular positions about said axis.

It is thus possible to limit the positioning adjustments of the wall plate relative to the wall merely to ensuring that the hinge axis of the holding tray relative to the wall plate is horizontal, which can be performed particularly simply by turning the wall plate through a small angle while it is against the wall, while using any appropriate level-monitoring means, such as a spirit level or a laser telemeter, prior to securing it firmly to the wall.

This adjustment can be made easier if, in a variant embodiment of the present invention, the wall plate is not fixed to the wall directly, but provision is made for the support means include an intermediate jig for fixing the wall plate to said surface, and suitable itself for being fixed to said surface and for removably receiving the wall plate in a determined relative position. Since such a jig can be lighter and easier to handle than the wall plate, it can be easier to position the jig accurately relative to the wall and then to fix it to the wall while retaining the accurate adjustment already obtained, after which the wall plate can be installed on the jig. Also, when of appropriate dimensions, such a jig can enable a wall plate to be fixed overlying a zone of a wall which, on its own, is not strong enough to allow the plate to be fixed directly thereto, the jig making it possible for fixing proper to be offset to stronger zones of the wall, such as its top or bottom tie beams or piers, assuming, as is the case in a preferred embodiment, that the jig is suitable for being fixed to said surface in at least one location that is offset from the wall plate occupying said determined relative position.

Provision may optionally be made for individual actuation of the various devices of the invention that are distributed around a framework for the purpose of lifting it together with that portion of a building which is resting thereon, e.g. a roof or a floor, in which case the devices may be of any type, but they then require a large amount of manpower to control their operation, and it still remains difficult to synchronize operation, with the attendant risk of damaging the framework.

Consequently, it is preferable to select the controlled thrust means from a group comprising hydraulic jacks and electromechanical jacks, associated with remote control means in common with other lifting devices (i.e. preferably all of the devices used for lifting the framework after other lifting devices) in order to synchronize a set of lifting devices from a single control point. The term "remote control means" is used herein both for means associated with a single source of hydraulic fluid under pressure and for means associated with electricity, as the case may be, and connected respectively by a bundle of hydraulic ducts or of electric cables to the various jacks, as well as more conventional radiocontrol means actuating on jacks that are self-contained as to the supply of hydraulic fluid or of electricity, as the case may be.

Whatever their design, the controlled thrust means may be used to lift the framework through the full desired height in a single operation, and can then be used to hold the framework at the level reached for the time required to raise the wall up to said level.

However, that requires jacks of large size, and if it is desired that they should hold up the framework throughout the time required for raising the wall, that gives rise to considerable expense in terms of energy, and also to the jacks being tied up for a long period of time when it might be preferable for them to be in use on other sites.

It is therefore preferred to use an embodiment in which the controlled thrust means are removable independently of the guide means, thereby making it possible, after the framework has been lifted through a certain stroke, and once the desired level has been reached, for the guide means to be left in place to perform their function, while the thrust control means are completely dismantled and used on some other site.

To this end, provision is also made for the device of the invention to include means independent of the thrust means for temporarily immobilizing the cursor at at least one lift position that is determined relative to the common connection means.

These means for temporary immobilization of the cursor can be in various different forms, depending on the design of the guide means.

Thus, in an embodiment in which the guide means include at least one guide rod disposed along said direction and guided in translation therealong relative to the common connection means, and the cursor is rigidly secured to said at least one guide rod, the means for temporarily immobilizing the cursor advantageously include means for temporarily immobilizing the at least one guide rod, against translation in said direction relative to the common connection means. For example, for this purpose, pinning may be provided by means of holes distributed along the guide rod and holes provided in the connection means, e.g. constituted by the above-mentioned holding tray or in the wall plate, thereby simultaneously providing temporary immobilization that is particularly effective, simple to install and then to remove, and requiring few additional members, in practice a simple pin engaged in appropriately chosen holes of the guide rods and simultaneously holes of the connection means or of the wall plate.

In another embodiment, in which the guide means include at least one guide rod disposed along said direction and immobilized against translation therealong relative to the common guide means, the cursor then being mounted to move in translation along said direction on said at least one guide rod, the means for temporarily immobilizing the cursor include means for temporarily immobilizing the cursor against translation along said direction relative to the at least one guide rod. A person skilled in the art will readily understand that this temporary immobilization can likewise be performed by pinning, for example, by means of holes distributed along the guide rod and holes provided in the cursor, under conditions of simplicity and effectiveness analogous to those mentioned above. Naturally, under such circumstances, it may be necessary to allow the guide rods to pass through a portion of the building resting on the framework, in particular a roof, however that requires only a few local passages to be provided and they are easily closed subsequently, and in the example of a roof, this requires a few tiles or slates to be removed, where tiles and slates are easily replaced subsequently.

In the last-described embodiment, where the at least one guide rod is fixed in translation relative to the common connection means, provision may be made for the guide rod to be secured to a link box at the end thereof, relative to the cursor, that is remote from the common connection means, and at a distance from the common connection means which is compatible with a predetermined maximum lifting stroke for the roof, the link box providing links with ties for connection to the link box of at least one other lifting device. This disposition makes it possible to interconnect the guide rods of all or some of the devices of the invention that are distributed around the framework to be lifted, and in particular to constitute a static belt of ties mutually interconnecting the guide rods of all of the devices above the framework and the portion of the building that it carries, thereby co-operating with the guide rods and the walls, via the wall plates, to create an assembly that is rigid, of a shape that is accurately determined, and in which the guide rods remain accurately parallel to one another so as to avoid applying any traction or compression stresses to the framework as the cursors move up the guide rods, thus avoiding any deformation of or damage to the framework and the portion of the building that it carries.

Such a static belt is particularly effective with four-slope roofs where it is easy to dispose all of the ties horizontally so as to build up a rectangular frame, it being understood that it can also be used for roofs of other shapes.

Independently of the way in which the guides means are embodied, provision may be made for the cursor to include mechanical link means for linking with the cursor of at least one other lifting device, e.g. in the form of at least one cantilevered-out arm perpendicular to said orientation and suitable for being placed in line with the arm of the cursor of another lifting device in an alignment that is substantially horizontal and substantially parallel to said surface, and rigidly connected to said other arm by a rectilinear beam disposed along said substantially horizontal alignment. A person skilled in the art will readily understand that the rectilinear beam interconnecting in this way the cursors of two lifting devices of the invention, in practice two adjacent cursors, can support the underside of the framework as can the cursors themselves, and in particular the beam can support the framework between cursors, thereby enabling the support forces on the framework to be distributed, and consequently avoiding deformation thereof between such supports. In order to avoid having to use wedges for this purpose in order to accommodate possible differences of level between the cursors, it is advantageous to provide for all of the cursors to include means for adjusting the level of said at least one arm in said direction.

Naturally, each cursor preferably includes two such arms, on respective sides of the guide means, thereby making it possible for such continuous support to be provided over as large a fraction as possible of the perimeter of the walls.

For two-slope roofs, this distribution of support can be provided at the bottoms of the two slopes. Nevertheless, it can also be provided over gable walls, and, where appropriate, over inside walls, by providing means enabling a cursor to carry, where appropriate, not only an arm enabling it to be linked with another cursor of a device of the invention disposed at the bottom of a roof slope, but also a link device for linking with a truss, in particular an adjustable truss, suitable for being placed beneath the framework over a gable wall or a structural inside wall, and for being connected via a similar link device, to the cursor of at least one other lifting device, thereby enabling a support belt to be formed around the entire perimeter of the roof, said belt being dynamic in that it moves up with the cursors so as to continue providing distributed support for the framework at any level to which the roof may be raised. Preferably, the cursor includes level adjustment means for adjusting the level of said at least one arm and/or of said link device in said direction.

For a four-slope roof or for a roof of complex shape, provision is made for the cursor further to include means for adjusting the orientation of said at least one arm about an axis extending in said direction, and by providing two such arms capable of being placed at an angle to each other, in particular 90°, thereby making it possible to provide such a dynamic support belt for the entire perimeter of the roof.

When the supported structure is a floor, either solution can be selected, whereby the framework rests on only two supporting walls or else it rests on four supporting walls.

In all cases, it should be understood that devices of the invention are installed on load-bearing walls only, be they outside walls or inside walls.

Preferably, in order to make it easier to establish said distributed support for the framework, provision is made for the cursor to include adaptation means for adapting the shape of said element to the framework that it is to carry, said adaptation means advantageously being suitable for enabling a lifting device of the invention to be used not only at the bottom portions of the slopes of a roof or beneath a floor, but also on inside walls and on gable walls, for two-slope roofs.

In all cases, the cursors, the arms cantilevered out therefrom, the means interconnecting said arms, and the above-mentioned adaptation means can engage the underside of the framework directly if the structure of the framework is suitable therefor, or indirectly via rigid beams receiving the inferior purlins of any kind of roof and, for two-slope roofs, receiving the principal rafters. In addition, this support may be provided by means of a cushion of elastically compressible material such as natural or synthetic rubber, imparting a certain amount of flexibility thereto suitable for compensating for tolerances in the shape of the framework, in the positioning of the lifting devices, and in synchronization between them.

Also, if no level adjustment is provided for the lifting device, i.e. if no provision is made for fine correction of the horizontalness of the tilt axis of the holding tray, it is necessary to provide very accurate attachment of the wall plate, while verifying that the top edge thereof is accurately horizontal, and in practice that is not always possible. To this end, the invention also provides a more advanced embodiment in which the lifting device is organized to enable such level adjustment to be performed, while simultaneously simplifying the general structure of the device so as to reduce its weight and manufacturing cost.

In an advantageous embodiment of the above-mentioned lifting device, provision is thus made whereby said lifting device further includes adjustment means for adjusting verticality along the above-mentioned identical orientation of the guide means and of the controlled thrust means, and adjustment means for adjusting level, said adjustment means for adjusting verticality and level connecting the support means to the common connection means.

These adjustment means for adjusting verticality and level thus enable the guide means and the thrust means of each lifting device to be positioned very accurately, ensuring that said means are accurately vertical, such that lifting proper can be performed with complete reliability by operating all of the lifting devices simultaneously.

Preferably, the support means include an intermediate support plate mounted to slide along a substantially vertical direction in a slideway secured to the wall plate, said intermediate plate having means for fixing to the adjustment means for adjusting verticality and for adjusting level. In particular, by mounting the intermediate support plate slidably it is possible to achieve accurate initial adjustment of the height of the base of the support means, and the intermediate support plate made independently of the wall plate also makes it possible to simplify installing and removing the device.

In which case, advantageously, the intermediate support plate is suspended by a threaded rod from a cross-member of the wall plate so as to enable the height of said intermediate support plate to be adjusted, and the wall plate has at its top a bracket to enable said wall plate to be supported directly on a wall tie beam.

Also preferably, the fixing means are organized to allow the adjustment means to pivot about an axis suitable for being disposed horizontally and parallel to the surface of the wall.

It is also advantageous for the common connection means to include a holding tray on which the guide means and the controlled thrust means are supported, and for the holding tray to have the adjustment means for adjusting verticality and level passing therethrough, in particular for the tray to have oblong through openings associated therewith and allowing angular displacements that correspond to adjusting verticality and level.

In a particular embodiment, the adjustment means for adjusting verticality and for adjusting level comprise respective threaded shafts on which respective adjustment bushes are screwed.

In which case, advantageously, the threaded shaft of the verticality adjustment means is secured to a cylindrical head received in a hollow bar forming the associated fixing means of the intermediate support plate, and the threaded shaft of the level adjustment means is secured to a hinge head connected in hinged manner to the intermediate support plate by a hinge pin passing through brackets forming the associated fixing means of said intermediate support plate.

Also preferably, each adjustment bush has an end head passing through one of the oblong openings and forming a drive member for performing the corresponding adjustments.

BRIEF DESCRIPTION OF THE DRAWINGS

Other characteristics and advantages of the invention appear more clearly in the light of the following description and the accompanying drawings, relating to particular embodiments, and given with reference to the figures, in which:

FIG. **1** is a perspective view of an assembly comprising a wall plate fixed in its in-use position on a wall, together with a holding tray mounted on the wall plate, likewise in its in-use position;

FIGS. **2** and **3** are perspective views respectively of the wall plate and of the holding tray, likewise in their in-use positions;

FIG. **4** is a perspective view showing how devices of the invention can be used for lifting a two-slope roof, with the framework corresponding to only one of the slopes being shown, and with it being shown in its low position, i.e. prior to being lifted; this figure shows only two devices of the invention, but naturally a larger number of such devices are distributed around the roof to be lifted;

FIG. **5** shows a detail of FIG. **4**;

FIG. **6** shows the same detail at a different orientation;

FIG. **7** is a view analogous to that of FIG. **4** showing the final step in lifting the roof, with the roof now in its high position;

FIG. **8** is a perspective view showing the use of the devices of the invention for lifting a four-slope roof, of which only the framework has been shown;

FIG. **9** shows a detail of FIG. **8**;

FIG. **10** shows a particular embodiment of a lifting cursor, and adaptable to various framework structures;

FIG. **11** is a perspective view showing another way in which devices of the invention can be used when lifting a four-slope roof; only two of the devices are shown, but others are distributed around the roof, under the same conditions as in the method of use shown in FIG. **8**;

FIG. **12** is a perspective view of an intermediate accessory for fixing the wall plate to a wall, with use thereof being optional;

FIGS. **13** to **15** are perspective views showing details of FIG. **4** or of FIG. **7**, in particular of the devices that link a cursor of a device of the invention with a truss, in particular an adjustable truss, disposed beneath the framework over a gable wall for a two-slope roof, in the manner shown, or over an inside wall supporting a two- or four-slope roof, in a manner that is not illustrated but that is similar;

FIGS. **16** and **17** are perspective views showing two ways of linking a truss main beam and a principal rafter of said additional truss with an intermediate purlin of the framework;

FIG. **18** is a front view of a variant of the lifting device in which provision is made for level adjustment means, with the guide columns being sectioned in this figure to show more clearly the structure of the wall plate, and with the lifting cursor that slides on said two rods being represented only diagrammatically in contact with the bottom edge of the framework to be lifted (symbolized by chain-dotted lines);

FIG. **19** is a section on XIX—XIX of FIG. **18**, showing more clearly how the holding means and the means for adjusting verticality are organized;

FIG. **20** is a section on XX—XX of FIG. **19**, showing in particular in diagrammatic manner two types of possible organization for jacks constituting the controlled thrust means; and

FIG. **21** is an exploded perspective view showing more clearly the components of the lifting device of FIGS. **18** to **20**.

MORE DETAILED DESCRIPTION

For reasons of convenience, the various components of apparatus of the invention are described with reference to the position they occupy, within acceptable tolerances, when they are being used to lift a roof, where the term "roof" covers not only outer covering elements proper, but also the framework structure supporting them. Naturally, the present invention also applies to lifting other portions of a building that have their own frameworks, e.g. floors, providing adaptations are made within the normal aptitudes of a person skilled in the art.

In all of the applications shown, the devices of the invention, referenced **63**, are used in appropriate number to spread lifting forces as well as possible, and they advantageously comprise identical respective wall plates **1** and identical holding trays **42**, which are initially described with reference to FIGS. **1** to **3**.

In the embodiment shown, the wall plate **1** comprises a vertical plaque **2** for fixing to the wall **3**, said plaque **2** being defined by two mutually parallel and vertical plane faces **4** and **5**, the first face being adjacent to an approximately vertical surface **112** that is particularly, but not exclusively, an outside face of the wall **3**. These two faces **4** and **5** are, for example, square in shape and they meet via a small face **6** having two vertical zones, or vertical edges of the plaque **2**, and two horizontal zones or horizontal edges of the plaque **2**, and are advantageously usable for adjusting the orientation and the level of the wall plate **1** while it is being fixed to the wall **3** so as to ensure that the top and bottom horizontal edges of the fixing plaques **2** of the plates **1** corresponding to the set of devices of the invention distributed around a roof are disposed in respective common horizontal planes. The plaque **2** is removably fixed to the wall **3**, e.g. by screws passing through through holes **7** extending perpendicularly to the faces **4** and **5**, and located, for example, in the four corners of the plaque **2**.

In general, the face **4** is pressed fully against the surface **112**, and is fixed thereto in this disposition, however when a device **63** is located close to a projecting corner of the wall **3**, it may be pressed against and fixed to the surface **112** over only a portion of its extent, being also pressed against and fixed to an angle member **113** extending the wall and fixed to the wall **3**, as shown in FIGS. **4**, **5**, and **6**.

Instead of being fixed directly to the wall **3** by screws passing through the holes **7**, particularly when the zone of the wall **3** adjacent to the part **2** does not have sufficient mechanical strength for this purpose, the plaque **2** may also be fixed to the wall **3** via a fixing accessory or jig **115**, shown in FIG. **12**, enabling the load of the wall plate **1** to be distributed and thereby distributing the load of the device **63** as a whole plus the corresponding portion of the roof to be lifted, over zones that are mechanically stronger, and in particular the top tie beam, and in a variant the bottom tie beam of the wall, or indeed on the piers thereof.

FIG. **12** shows two variant embodiments of the fixing jig **115**, one of which is drawn in solid lines while the other includes additions relative to the first which are drawn in chain-dotted lines, the jig **115** being made in both cases in the form of a rigid flat trellis, e.g. made of metal or of composite material, defining a plane face **208** whereby the jig **115** is laid flat against the surface **112** of the wall **3** in a determined position of use, in which position it is removably fixed to the wall and in which the jig **115** is described below.

In the variant embodiment shown in solid lines, for suspending the wall plate **1**, and together therewith the entire device **63**, from the top tie beam (not shown) of the wall **3**, the jib **115** has two rectilinear, mutually parallel vertical uprights **116** laid against the surface **112** of the wall **3** when the jig **115** is in its predetermined position of use.

In this predetermined position, the two uprights **116** have respective top end lengths **117** placed higher than the wall plate **1** and serving to fix the jig **115** to the top tie beam of the wall **3**. To this end, the two uprights **116** are pierced in their top end lengths **117** by through holes **118** for screws for fixing to the top tie beam, which holes are provided in several different positions along each of the lengths **117** in the vertical direction, extending perpendicularly to the face **208** of the jig **115** as defined in particular by the two uprights **116**.

Downwards, each upright **116** also has a bottom end length **119** which is intended to rest freely and flat against the face **112** of the wall **3**.

Between the top and bottom end lengths **117** and **119**, the two uprights **116** have intermediate lengths **120** spaced apart by two horizontal cross-members, respectively a top member **121** at the junction with the top end length **117**, and a bottom member **122** at the junction with the bottom end length **119**, and by a diagonal brace **123** connecting the junction between one of the uprights **116** and the top cross-member **121** to the junction between the other upright **116** and the bottom cross-member **122**. The brace **123** and the two cross-members **121** and **122** preferably co-operate with the two uprights **116** to define the plane face **208** laid flat against the face **112** of the wall **3** when the jig **115** is fixed thereagainst, and also another plane face **209** parallel to the face **208** and consequently facing in the same direction as the face **112** of the wall **3**.

The two cross-members **121** and **122** are vertically spaced apart by a distance close to that between the top and bottom horizontal edges of the plaque **2**, and each of them has a respective horizontal slideway **124**, **125** secured thereto and projecting from the face **209** to co-operate with said face **209** to define respective horizontal grooves **126** and **127**. The groove **126** corresponding to the top cross-member **121** is open in a downward direction and the groove **127** corresponding to the bottom cross-member **122** is open in an upward direction, the two grooves **126** and **127** also being open at either end in a horizontal direction parallel to the face **209** of the jig **115**. The relative positioning of the two grooves **126** and **127** and the dimensioning thereof is such that it is possible to insert therein by horizontal sliding parallel to the face **209**, and without any play other than the clearance necessary to allow such sliding, respectively a margin zone of the plaque **2** adjacent to its top horizontal edge, together with said top horizontal edge itself, and a margin zone of the plaque **2** adjacent to the bottom horizontal edge thereof together with said horizontal edge itself, with the face **4** of the plaque **2** being vertical and sliding flat over the face **209** of the jig **115**. The grooves **126** and **127** retain the plaque **2** against movement in any direction other than in a horizontal direction parallel to the face **209**, particularly when the plaque **2** is in a position as shown by chain-dotted lines in FIG. **12**, in which position the top and bottom sides thereof are horizontal and its vertical edges are symmetrical about a midplane (not referenced) of jig **115**, which midplane is vertical and forms a plane of symmetry between the two uprights **116**. The face **4** of the plaque is then pressed flat against the face **209** of the jig **115** between the two slideways **124** and **125**, being parallel to the face **112** of the wall because of the shape and the orientation of the grooves **126** and **127**, and more precisely it is pressed flat against the intermediate lengths **120** of the two uprights **116**, against the two cross-members **121** and **122**, and against the brace **123**, which thus constitutes intermediate means whereby the plaque **2** is pressed flat against the face **112** of the wall **3**.

When the plaque **2** is positioned in this way, it is prevented in releasable manner from escaping from the slideways **124** and **125** by sliding horizontally parallel to the face **209**, by means of the two slideways **124** and **125** having holes **128** disposed to correspond with the holes **7** so that once the plaque **2** is in the position shown in FIG. **2**, each of said holes **128** coincides with a respective hole **7**, thus making it possible to engage pins or any other removable retaining means in the holes brought into coincidence in this manner to prevent the plaque **2** sliding relative to the slideways **124** and **125**.

A person skilled in the art will readily understand that use of the jig **115** makes it possible to place the plaque **2** at locations on a wall **3** that do not themselves have the necessary mechanical strength for the plaque **2** to be anchored directly thereto by screws engaged through the holes **7** thereof. A person skilled in the art will also readily understand that the jigs **115** can be implemented in much more lightweight form than can the wall plate **1**, and can therefore be much easier to position accurately so that the grooves **126** and **127** are indeed horizontal before the jig is fixed to the wall **3**, with accurate positioning of the wall plate **1** then being the result merely of engaging its plaque **2** in the two grooves **126** and **127** prior to locking it therein by pins or the like via the coinciding holes **128** and **7**.

The other variant embodiment of the jig **115** shown in FIG. **12** uses the same elements as those described above with the exception that the bottom end lengths **119** of the two uprights **116** are extended vertically in the manner suggested by chain-dotted lines in FIG. **12** down to the level of bottom tie beam (not shown) of the wall **3**, being stiffened by horizontal cross-members and diagonal braces, entirely similar to the cross-members **121** and **122**, and to the brace **123**. The bottom end lengths **119** extended in this way have holes entirely comparable to the holes **118** located at a level corresponding to the level of the bottom tie beam of the wall **3**, and distributed like the holes **118** in the vertical direction so as to receive screws for fixing to the bottom tie beam of the wall **3**. This fixing is combined with fixing to the top tie beam thereof, thereby stiffening the retention of the wall plate **1** against the wall **3** via the jig **115**.

Naturally, other embodiments of such a jig could be devised without thereby going beyond the ambit of the present invention.

On its face **5**, the plaque **2** is secured to a flat horizontal cradle **8** that is cantilevered out and braced relative to the wall plate **1** by gussets **9** and braces **10**, also constituting a portion of the wall plate **1**. When seen in plan view, i.e. in a vertical direction, the cradle **8** is generally rectangular in shape with one of the long sides thereof being defined by its junction with the face **5** of the fixing plaque **2** and with its other sides being defined by a small face **11** formed by vertical plane facets that are perpendicular in pairs and not referenced. The bottom of the cradle **8** is defined by a bottom face **12** of shape that is not important, being plane and horizontal, for example, while its top is defined by a top face **13** which, although being generally flat in shape and being oriented generally horizontally, has a concave shape as described below.

Along the small face **11**, the top face **13** has a horizontal plane edge **14** defined both by the small face **11** and by a shoulder **15** parallel to the small face **11**, i.e. defined in like manner by facets that are plane, vertical, and perpendicular in pairs, and likewise co-operating with the face **5** of the wall plate **1** to define a rectangular plane. The top of the shoulder **15** joins the edge **14** while the bottom thereof joins three panels **16**, **17**, and **18** of the top face **13**, defining a rim around the assembly formed by said panels **16**, **17**, and **18** together with the face **5** of the wall plate **1**. The panel **16** is plane, horizontal, and runs along the face **5** of the wall plate **1**. It is rectangular with one of its long sides being defined by its join with the face **5** and with its two short sides being defined by its join with the shoulder **15**, and going away from the face **5** of the wall plate **1**, its other long side joins the panel **17** perpendicularly to the face **5**, which panel **17** is concave in shape, and more specifically has the shape of a portion of a circular cylinder about a horizontal axis **19** that is parallel to the face **5** of the wall plate **1** and is situated on the same side thereof as the cradle **8**, overlying the cradle. The angular extent of the panel **17** about the axis **19** is less than 180°, e.g. about 45°, equally distributed on either side of a vertical plane **20** that includes the axis **19**, i.e. that is also parallel to the face **5** of the wall plate **1**. When seen in plan view, the panel **17** is thus likewise rectangular in shape, with a long side thereof being defined by its join with the panel **16**, running along the long side thereof, and with two short sides defined by its joins with the shoulder **15**. Going perpendicularly away from the face **5** of the wall plate **1**, the other long side of the panel **17** joins the panel **18** which is plane and coplanar with the panel **16**, and when seen in plan view is substantially rectangular in shape with a long side defined by its join with the panel **17** and with its other long side and its two short sides defined by its join with the shoulder **15**.

In a vertical plane **21** perpendicular to the axis **19** and to the plane **20**, constituting a plane of symmetry for the wall plate **1**, i.e. for the fixing plaque **2** and the cradle **8** thereof, and also for the lifting device of the invention considered as a whole, the cradle **8** has a notch **22** opening out in its small face **11** and also in its bottom and top faces **12** and **13**, but not extending as far as the wall plate **1**. More precisely, the notch **22** is defined by two lateral flanks **23** that are plane, vertical, mutually parallel, and mutually symmetrical about the plane **21**, the ends of the flanks **23** perpendicularly remote from the face **5** of the wall plate **1** join the small face **11**, the bottoms of the flanks join the bottom face **12**, and the tops of the flanks join the edge **14**, the shoulder **15** and the panel **18**. Going towards the face **5** of the wall plate **1**, and perpendicularly to said face, the two flanks **23** join a common end-of-notch flank **24** which is concave and semi-cylindrical about a vertical axis **25** situated in the plane **21** and passing at least approximately via the junction between the panels **17** and **18** of the top face **13** of the cradle **8**. The bottom of the end flank **24** thus joins the bottom face **12**, and its top joins the panel **17** of the top face **13**, being approximately halfway across said panel **17** going perpendicularly from the join between the panel **17** and **18** towards the face **5** of the wall plate **1**.

Also, the cradle **8** is pierced by through holes **27** on two vertical axes **26** situated in the plane **20** perpendicularly to the axis **19** and disposed mutually symmetrically about the plane **21**, the holes passing from the panel **17** of the top face **13** to the bottom face **12**, which two holes **27** are defined by respective inside peripheral faces **28** that are circularly symmetrical about the respective axes **26**, the diameter of the holes being approximately equal to the size of the panel **17** perpendicularly to face **5** of the wall plate **1** between its joins respectively with the panel **16** and with the panel **18**.

Above the cradle **8**, the face **5** of the fixing plaque **2** has removable fixing means for two devises **29** that are disposed symmetrically about the plane **21**, the fixing means being, for example, in the form of respective vertical slideways **30** for receiving the devises **29** by sliding vertically along the face **5** of the fixing plaque **2**. Two abutments (not shown) limit downward sliding of the devises **29** so that they remain spaced away from and above the top face **13** of the cradle **8**, and through holes **31** are formed in the fixing plaque **2** to receive pins (not shown) for releasably locking the devises **29** against sliding upwards in the slideways **30**. When the devises **29** are locked in this way against sliding both upwards and downwards relative to the slideways **30**, they occupy a determined position relative to the fixing plaque **2**, and it is this position that they are described.

Each clevis **29** comprises a vertical flat web **32** made against the face **5** of the wall plate **1** and co-operating with the slideways **30** for vertical sliding guidance of the clevis **29** relative to the fixing plaque **2**, and by two flanges **33** that are likewise flat and vertical, but that extend perpendicularly from the web **32** and the face **5** of the fixing plaque **2**, so as to be cantilevered out over the top face **13** of the cradle **8**, while being spaced upwards from said top face, as mentioned above. The two devises **29** disposed symmetrically about the plane **21** are also symmetrical about respective planes of symmetry (not referenced) parallel to said plane **21** and including the axes **26** of respective ones of the holes **27**. In other words, the two flanges **33** of each clevis **29** are disposed symmetrically about a plane including the axis **26** of the inside peripheral face **28** of a respective one of the holes **27**, which plane is perpendicular to the axis **19**.

Each of the flanges **33** is of a size so as to intersect the axis **19** and has, essentially above said axis, a respective slot **34** passing through the flange parallel to the axis **19**. The slots **34** are identical in shape, each being in the form of a portion of a circular annulus about the axis **19**, occupying an angular extent which is about 120° in the example shown. Nevertheless, this value is given merely by way of non-limiting example.

The slots **34** in the two flanges **33** of each of the devises **29** receive and guide respective rectilinear pins **35** in rotation about the axis **19** relative to the clevis **29** and consequently relative to the wall plate **1**, each pin **35** has an axis **36** parallel to the axis **19** with the axis **36** thus being offset vertically relative to the axis **19**. It will be observed that the two pins **35** corresponding to the two devises **29** are independent of each other, but the person skilled in the art will understand, on reading the description below, that they are, in fact, in alignment when they are in operation. The two pins **35** are prevented from sliding parallel to their axes **36** or to the axis **19** relative to the flanges **33** of the corresponding clevis **29**, e.g. by means of appropriate shoulders bearing against the flanges **33** around the slots **34**, however they are removably mounted, each of them being made, for example, by assembling together a plurality of portions screwed together along the axis **36** in a manner that is not described in detail but that is readily understandable to the person skilled in the art.

Finally, beneath the cradle **8**, on either side thereof and vertically below it, the fixing plaque **2** carries two non-removable devises **37** projecting from the face **5**, and these two devises **37** carry respective threaded rods **39** mounted to pivot about a common axis **38** parallel to the axis **19** and situated in the immediate vicinity of the face **5**, the rods having no other freedom of relative movement. Each of the rods **39** has a respective axis **40** extending perpendicularly to the axis **38**. Each of the threaded rods **39** can receive two nuts **41** for a purpose that is described below.

To co-operate with a wall plate **1** as described above, the holding tray **42** is of a structure described below.

The holding tray **42** is designed to rest on the cradle **8**, and for this purpose it comprises a support plate **43** designed to be partially received between the shoulder **15** of the cradle **8** and the face **5** of the fixing plaque **2** while leaving the possibility of tilting relative thereto to a limited extent about the axis **19** so as to make it possible to adjust the horizontal position of the plate **43** in the event that the wall **3** is not vertical, thereby causing the face **5** to be not vertical, it nevertheless being possible to ensure that the axis **19** is horizontal by ensuring that the top and bottom zones of the small face **6** of the fixing plaque **2** are horizontal.

More precisely, the support plate **43**, assumed to be horizontal, has a top face **44** that is plane and horizontal, that is generally rectangular in plan view as defined by its connection with a vertical small face **45**, with the bottom of the small face being connected to a bottom face **46** that is indeed identically rectangular in plan to the top face **44**, but that is not plane, and more precisely that is shaped to correspond with the shape of the panels **16** to **18** of the top face **15** of the cradle **8** so as to provide the above-mentioned guidance for tilting about the axis **19**.

To make such tilting possible, the shape of the support plate **43** in plan view, i.e. the shape of its top and bottom faces **44** and **46** in plan view is substantially identical to the shape defined in plan view by the shoulder **15** on the top face **13** of the cradle **8** in co-operation with the face **5** of the fixing plaque **2**, however the dimensions are slightly smaller so as to leave operating clearance that may be less than 1 mm between the small face **45** of the support plate **43** and the rim formed around the panels **16** to **18** by the shoulder **15** and the face **5** of the fixing plaque **2**.

To co-operate with the panels **16** to **18** of the top face **13** of the cradle **8**, the bottom face **46** of the support plate **43** likewise presents three panels **47**, **48**, and **49**, with the panels **47** and **49** being plane, coplanar, parallel to the face **44** and disposed on respective sides of the panel **48** which is convex in complementary manner to the concave shape of the panel **17** of the top face **13** of the cradle **8**.

More precisely, the panel **48** is in the form of a portion of a circular cylinder about an axis which, when the holding tray **42** is co-operating with the wall plate **1**, coincides with the axis **19**, so both axes are given the same reference numeral. The panel **48** is thus identical in diameter to the panel **17**, however its angular extent is slightly greater, e.g. being of the order of 60°, and each of the panels **47** and **49** extends between its connection with the panel **48** and the small face **45** of the support plate **43** over a distance that is smaller than the distance covered respectively by the panel **16** between the panel **17** and the face **5** of the fixing plaque **2**, and the distance covered by the panel **18** between the panel **17** and the shoulder **5**, such that when the holding tray **42** is in operation it has its panel **48** resting on the panel **17** with guidance for relative tilting about the axis **19**, and its panels **47** and **49** are placed facing the panels **16** and **18** respectively, while leaving a certain amount of clearance relative thereto so as to make the above-mentioned tilting possible, during which one of the panels **47** and **49** can come into contact with the corresponding panel **16** or **18**, which corresponds to an end limit on the above-mentioned tilting, with the other two panels then not touching each other.

It will be observed that the devises **29** are positioned relative to the cradle **8** in such a manner that there is no contact between the devises and the top face **44** of the support plate **43**, i.e. the devises **29** do not put a limit on the tilting. Nevertheless, the devises **29** are positioned so that they prevent the support plate **43** from escaping upwards from the cradle **8**, and they are removably mounted on the face **5** specifically to enable the holding tray **42** to be installed and removed relative to the wall plate **1**.

When the holding tray **42** is co-operating with the wall plate **1**, the plane of symmetry **21** of the wall plate likewise constitutes a plane of symmetry for the tray, and immediately above the notch **22** in the cradle **8** the holding tray **42** has a notch **50** of the same shape in plan view, and likewise symmetrical about the plane **21**. More precisely, this notch **50** is defined by two plane lateral flanks **51** that are parallel and symmetrical about the plane **21** and they are spaced apart therefrom by a distance that is identical to the distance between said plane and the lateral flanks **23** of the notch **22** so as to extend respective ones of said flanks **23** upwards. Thus, the lateral flanks **51** extend firstly to the small face **45** of the support plate **43** and secondly to the top face **44** thereof and to the panel **49** in its bottom face **46**. The notch **50** is also defined by a likewise vertical concave end flank **52** running on from the lateral flanks **51** going away from their connections with the small face **45**. This end wall face **52** is, for example, circularly cylindrical about a vertical axis **53** in the plane **21**, which axis **53** is situated on the same side of the axis **19** as is the axis **25**, and when the holding tray **42** is appropriately tilted about the axis **19** relative to the wall plate **1**, the axis **53** can coincide with the axis **25**, otherwise it intersects it. The respective diameters of the end wall flanks **52** and **54** are identical, so the end wall flank **52** extends the end wall flank **24** upwards when the axis **53** coincides with the axis **25**. The end wall flank **52** extends upwards to the top face **44** of the support plate **43** and downwards to the convex panel **48** of the bottom face **46** of the support plate.

Around the end wall flank **52** of the notch **50** there are distributed three tapped holes **54** that are all at the same distance from the axis **53**. These holes have respective axes **55** parallel to the axis **53**, with the axes **55** being equidistant therefrom. As appears below, these tapped holes **54** extend from the top face **44** at least and are intended to receive fixing bolts in the support plate **43** for securing a lifting jack extending along the axis **52** and engaged in the notch **50** of the support plate **43** and also in the notch **22** of the cradle **8** so as to project below it.

Also, two holes **57** pass through the support plate along two axes **56** that are parallel to the axis **53** but that intersect the axis **19**, being disposed symmetrically about the plane **21** when the holding tray **42** is engaged on the wall plate **1**, and situated at the same distance from the plane **21** as are the axes **26**, thereby enabling the axes **56** and **26** to coincide when the holding tray **42** is tilted relative to the wall plate **1** about the axis **19** in such a manner that the axis **52** coincides with the axis **25**. The holes **57** extend downwards inside respective coaxial sleeves **58**, with each sleeve **58** being defined going away from the corresponding axis **56** by a circularly cylindrical outer peripheral face **59** about said axis **56** having a diameter that is smaller than the diameter of the inside peripheral face **28** of the corresponding hole **27** so that each of the sleeves **59** can pass through the cradle **8** via the corresponding hole **27** without preventing the holding tray **42** from tilting relative to the wall plate **1** about the axis **19**. On the inside, each hole **57** and the sleeve **58** extending it downwards are defined by a circularly cylindrical inside peripheral face **60** about the corresponding axis **56** and of a diameter that is smaller than that of the outside peripheral surface **59**. The bottoms of the sleeves **58** may be completely or partially closed, as is the case in the application described more particularly and shown in the drawings, or they may be downwardly open, as might be the case in the application described further on if it is desired to avoid having the sleeves **58** large in size parallel to their axes **56**. In the example shown, this dimension is such that the bottom of each sleeve **58** is situated at substantially the same level as the horizontal bottom zone of the small face **6** of the wall plate **1**.

The two sleeves **58** are identical, being disposed symmetrically about the plane **21**, each of them having an eyelet ring **61** on its outer peripheral face **59** and extending away from said plane **21**, the eyelets **61** may be stationary, but are preferably rotatable relative to the corresponding sleeve **58** about an axis **62** parallel to the axes **19** and **38** and situated approximately at the same level as the axis **38** so that each eyelet **61** can receive a respective threaded rod **39** whose axis **40** then intersects the axis **62** perpendicularly, thereby enabling the holding tray **42** to be locked against pivoting about the axis **19** relative to the wall plate **1** in a determined orientation that corresponds to the axes **53** and **56** being accurately vertical, by locking each eyelet **61** on the corresponding threaded rod **49** by means of the two nuts **41** thereon, said nuts being tightened on opposite sides of the eyelet **61**. In order to avoid impeding passage of the sleeves **58** through the holes **27** of the cradle **8** when the holding tray **42** is being installed on and removed from the wall plate **1**, and in order to avoid the need to overdimension the holes **27** for this purpose, the eyelets **61** are preferably mounted removably on the sleeves **58**, e.g. by being a push-fit, in a manner not shown, but easily implemented by a person skilled in the art.

FIGS. **4** to **8** and **11** show the assembly made up of a wall plate **1** and a holding tray **42** in various conditions of use.

In all of these conditions of use, a plurality of devices **63** of the invention, each comprising a wall plate **41** and a holding tray **42** are fixed via the respective wall plates **1** to the outside faces **112** of various outside walls **3** of a building whose roof is to be lifted by lifting the structural framework **65** thereof. It should be understood that the wall plates and the holding trays may differ partially in structure, and that it is also possible to fit devices **63** of the invention on inside walls, providing they are structural walls. The various devices **63** of the invention are installed so that the axes **19**, parallel to the respective faces **112** because the faces **4** of the respective plaques **2** are laid flat thereagainst, are horizontal, thereby obtaining appropriate adjustment of the orientation of each wall plate **1** against the face **112** of the wall **3** while it is being fixed thereto, and ensuring that the axes **53** and **56** are vertical, even if the axes **25** and **26** are not exactly vertical because the face **112** of the wall **3** is not exactly vertical, with this being done by tilting the holding tray **42** about the axis **19** relative to the wall plate **1**, and locking it in the position obtained by means of the eyelets **61** and the nuts **41**.

In each of the applications shown, each of the assemblies comprising a hole **57** and the corresponding sleeve **58** receives in similar manner a respective coaxial rectilinear rod **64** that comes into downward abutment inside the corresponding sleeve **58** and that projects upwards above the top face **44** of the support plate **43** over a height that is greater than the height through which it is desired to lift the roof, given that even if the wall plates **1** of the various devices **63** of the invention are secured as close as possible to the roof, i.e. as high as possible up the walls **3**, some of the components of each of the devices **63** of the invention must be interposed between the holding tray **42** and the roof.

Each of the rods **64** is retained against upward extraction from the corresponding sleeve **58** and also against falling through it if it is downwardly open, by means of a respective one of the pins **35**. To this end, each rod **64** is engaged between the two flanges **33** of a respective clevis **29** and is pierced by a through hole (not shown) extending perpendicularly to its axis which coincides with the axis **56** and suitable for receiving on its axis one of the pins **35** then also engaged in the respective slots **34** of the two flanges **33** of the corresponding clevis **29**. The slots **34** are shaped to allow the pins **35** to move relative to the flanges **33** as the direction of the axes **56** moves relative to the axes **36** while the holding tray **42** is being adjusted in orientation about the axis **19** relative to the wall plate **1**.

Each rod **64** passes through the roof from which a few tiles or slates need to be removed for this purpose, and thus has a respective free end **66** located above the roof. The two free ends **66** of the pair of rods **64** are secured to each other by being engaged in respective blind holes (not shown) of a link or connection box **60** belonging to said pair of rods, and the box **67** may also be fixed thereto by any appropriate means, in particular by pins or screws.

In the example shown, the connection box **67** is generally in the form of a rectangular parallelepiped being defined in particular by a horizontal plane bottom face **68** in which the blind bores are formed, a top face **69** that is likewise plane and horizontal and towards which the bores in question are closed, vertical plane front and back faces **70** that are parallel to a plane (not referenced) defined by the two axes **56**, and two lateral faces **71**, likewise plane and vertical, and perpendicular to said plane, and disposed symmetrically about the plane **21**, as are the rods **64** given their coaxial mounting in the sleeve **58**.

The front and back faces **70** and the two lateral faces **71** are secured to respective devises **72**, **73** suitable for receiving and retaining, e.g. by means of pins on respective axes parallel to the axes **56**, rigid ties **74**, **75** for connection with the link box of a respective adjacent lifting device **63**. As a function of the positions of the two link boxes to be interconnected by a tie **74** or **75**, the person skilled in the art will select, on each of said link boxes, the most appropriate of the devises **72** on its front and back faces and the devises **73** on its lateral faces.

In this way, the ties **74**, **75** interconnect the link boxes **67** of the various devices **63** of the invention that are distributed around a roof, thereby forming a static belt above the roof, which belt is preferably continuous and serves to stiffen the structure at this level, particularly the structure as defined by the guide rods **64** which are also stiffened by their connections with the walls **3** via the holding trays **42** and the wall plates **1**, thereby making it possible to ensure that the various guide rods **64** of the various devices **63** remain accurately parallel along the full length of said rods **64**, i.e. even in zones thereof that are furthest away from their connections with the walls **3**.

To this end, in a manner that is not shown but that is easily designed by a person skilled in the art, it is also possible to provide connections by means of adjustable ties between each link box **67** and the adjacent wall plates **1** of the devices of the invention, e.g. between the clevis **72** of the link box and rings fixed to the face **5** of the fixing plaque **2** belonging to the wall plate **1** of each adjacent device, there being one ring in the vicinity of each bottom corner of the faces **5**.

A cursor common to each pair of guide rods **64** of each lifting device **63** is mounted to move in translation along the axes **56** of the rods, i.e. in vertical translation, and a first example of the cursor, referenced **76**, is shown in FIGS. **4**, **5**, **6**, **7**, **8**, **9**, and **11**, while a second embodiment, referenced **77**, is shown in FIG. **10**.

In its first embodiment, the cursor **76** presents, as can be seen best in FIG. **9**, the general shape of a rectangular parallelepiped defined by a bottom face **78**, a top face **79**, front and back faces **80**, and lateral faces **71** having the same orientations as the faces of the link box **67**.

Along each of the axes **56** which consequently pass perpendicularly through the bottom and top faces **78** and **79**, the cursor **76** is pierced by respective through bores **82** of inside section perpendicular to the corresponding axis **76** closely complementary to the outside section of a rod **64** perpendicularly to said axis, such that via these bores **82**, the cursor **76** is mounted to slide along the two rods **64** in a direction parallel to the axes **56**, i.e. vertically. The section may be circularly cylindrical about the corresponding axis **56**, as can the inside sections of the holes **57** and of the sleeves **58**, and as can the sections of the blind holes (not referenced) in the link box **67**, with said inside sections likewise being closely complementary to the outside section of the rods **64**. However other sections, likewise closely complementary, could naturally also be selected and in particular the outside of the rods **64** and the insides of the holes **57**, the bores **82**, and the blind bores (not referenced) in the link box **67** could equally well have some different section, e.g. a fluted section for indexing the rods **64** about their respective axes **56**, in particular for ensuring that the through holes of the rods **64** are properly perpendicular to the axis **56** to receive the respective pins **35** for retaining them relative to the wall plate **1**.

On each of its lateral faces **81**, the cursor **76** is secured to a projecting respective bearing **83** for a hinge connection about a respective axis **84** parallel to the axes **56** and situated in a plane (not referenced) common to the two axes **56**, the two bearings **83** being symmetrical about a plane coinciding with the plane **21**. In addition, the two bearings **83** are offset upwards relative to the bottom face **78** of the cursor **76** and downwards relative to the top face **79** thereof.

The bearings **83** enable the cursor **76** to receive various types of accessory, adapted to the structure of the roof framework **65** that is to be lifted, and to the position of the device **63** of the invention relative to the framework structure **65**.

A first such accessory, constituted by a bracket **85** is shown in duplicate in FIG. **9**, each bracket being carried by a respective one of the bearings **83** so that the brackets are disposed on respective sides of the cursor **76**, whereas in FIGS. **4**, **5**, **6**, and **11**, there can be seen cursors **76** each having only one such bracket **85**.

Each bracket **85** comprises three rectilinear arms **86**, **87**, and **88** which are rigid and which together form a rigid assembly, the first arm being parallel to the axis **84** and running next to it, the second being perpendicular to the axis **84** and being cantilevered out relative thereto from one end whereby said arm **87** is connected to the top end of the arm **86**, and the third arm extends obliquely between the free end of the second arm **87** and the bottom end of the first arm **86**, thereby constituting a brace between the two arms **86** and **87**, with the directions being given relative to a position in which the bracket **85** is assembled to the cursor **76**.

For the purposes of such assembly, the arm **86** carries on its side facing away from the cantilever formed by the arm **87**, a clevis **89** comprising two arms projecting perpendicularly to the axis **84** and intersecting it, namely a bottom arm **90** situated beneath the corresponding bearing **83** and a top arm **91** situated above said bearing and extending the arm **87**. These two arms **90** and **91** are mutually spaced apart along the axis **84** by a distance that is longer than the bearing **83** along said axis, and they receive securely but removably a common rod **92** lying on said axis **84** and serving to hinge the bracket **85** about the axis **84** in the bearing **83**. To this end, the outside of the rod **92** is circularly cylindrical about the axis **84** and the bearing **83** and the arms **90** and **91** are pierced along said axis by respective bores having the same section internally. To enable the assembly to be removable, the rod **92** may be constituted, for example, by a screw having a head that comes downward into engagement on the top arm **91** and that has a threaded end which receives a nut or a nut and lock nut assembly beneath the bottom arm **90**.

Along the axis **84**, the top arm **91** of the clevis **89** and the bearing **83** are positioned and dimensioned in such a manner that if the bracket assembly **85** is allowed to rest on the bearing **83** via the top arm **91**, then the bottom arm **87** of the bracket **85** presents, level with the top face **79** of the cursor **76**, and extending said top face **79**, a plane top face **93** which is perpendicular to the axis **84**, as shown in the lefthand portion of FIG. **9**. A gap is then left between the bearing **83** and the bottom arm **90** of the clevis **89**. This means that it is also possible to place the bracket **85** in a position where it is higher relative to the cursor **76**, as shown in the righthand portion of FIG. **9**. To this end, in a manner that is not shown, it suffices to interpose thickness pieces between the bearing **83** and the top arm **91** of the clevis **89**, but other means for adjusting the level of the bracket **85** relative to the cursor **76** could be provided without thereby going beyond the ambit of the invention, in particular rack and rachet systems, or systems comprising a lead screw, a nut, and an actuated lock nut, optionally servo-controlled electrically to ensure that the arms **87** of the various brackets **85** are all at substantially the same level.

Such an assembly also makes it possible to place the bracket **85** in a general orientation that is angularly offset, in particular through 90°, about the axis **84** relative to the cursor **76**, i.e. relative to the unreferenced plane common to the axes **56**, in the event of the device **63** of the invention being placed close to a reentrant or projecting angle of the wall **3**, and also shown by the righthand half of FIG. **9**, it being understood that the levels of the brackets **85** can be adjusted independently when two brackets are provided on a common cursor **76**, and that the orientations of the brackets can also be adjusted independently relative thereto.

This makes it possible to provide elements of the framework **65** of the roof to be lifted with good distributed support on the top face **79** of the cursor **76** and on the top faces **93** of the arms **87** of the brackets **85**.

In addition, the arms **87** of the brackets **85** are shaped so that it is possible to rigidly interconnect a bracket **85** carried by one cursor **76** with a bracket **85** carried by an adjacent cursor **76**, thereby constituting a dynamic belt around the framework **67**, i.e. providing support that is as continuous as possible for the elements of the framework **67** while it is being lifted and after it has been lifted while the walls **3** are themselves being raised to the desired level.

To this end, and as can also be seen from FIG. **9**, the arm **87** is constituted by a hollow, upwardly-open channel section member, i.e. a member that is open towards its face **93**, thereby enabling it to receive internally a rigid rectilinear beam **94** for linking with the top arm **87** of another bracket **85**, corresponding to an adjacent cursor **76**, so that said beam **94** extends the arm **87** horizontally and provides support for elements of the framework **67** via a top face **95** extending perpendicularly to the axis **84** and approximately coplanar with the face **93** of the arm **87**.

The beam **94** is shown in FIGS. **5** and **6**, in particular, in the form of an I-section bar with one of its flanges defining the top face **95**, but other embodiments could be selected without thereby going beyond the ambit of the present invention.

The beam **94** is preferably retained in removable manner on the two arms **87** that it interconnects by means allowing a limited amount of vertical tilting, compatible with possible differences in stroke between the cursors **76** or **77** while the roof is being elevated; by way of non-limiting example, tolerance of 3% per meter of stroke can be accepted in this respect when using jacks as described below for moving the cursors **76** or **77** along the guide rods **64**, with it being possible to reduce this tolerance to 0% by using electronic correction rules.

For example, the beam **94** is engaged in the channel-section bar constituting each arm **87**. It is retained therein firstly by engaging its end length received inside the channel-section beneath a horizontal pin **96** running along the top face **93** of the arm **87** close to the free end thereof and passing through the channel-section bar, perpendicularly thereto, in a position suitable for leaving limited vertical clearance relative to the beam **94** allowing the above-mentioned limited vertical tilting thereof and also allowing the beam **97** to slide inside the channel-section bar. The beam is also held by engaging another horizontal pin **97** that is removable parallel to the pin **96** but disposed outside the arm **87** and connected thereto by ties such as **98** hinged thereto about an axis **129** parallel to the pin **96** and adjustable in length, the pins being received in a suitably chosen horizontal hole in the beam **94** selected from a plurality of holes regularly distributed therealong, at least in the vicinity of the above-mentioned end length.

The above-mentioned differences in stroke between the cursors **76** or **77** give rise to a variation in the distance between the axes **129** corresponding to the two arms **87** that receive the same beam **94**, and each tie **98** preferably includes means allowing it to vary elastically to a limited extent the distance between the axis **129** which is fixed relative to the corresponding arm **87** and the pin **97** which is fixed relative to the beam **94**. For example, to this end, each tie such as **98** is in the form of a rectilinear rod **210** of constant section and extending perpendicularly to the axis **129**. At one end the rod **210** is secured to a sleeve **133** engaged coaxially around the pin **97** and removably secured thereto by any appropriate means, e.g. by means of a pin. A length of the rod **210** close to its opposite end is received and guided to slide perpendicularly to the axis **129** in a sleeve **130** which is itself hinged about the axis **129** on the arm **87**. On either side of the sleeve **130**, the rod **210** carries respective fixed adjustable abutments **131** and **132**, e.g. in the form of split rings that are tightly fixed on the rod **120**, with the spacing between the two abutments **131** and **132** in the length direction of the rod **210** being greater than the corresponding dimension of the sleeve **130** so as to accommodate said variation, and a helical spring **134** disposed coaxially about the rod is loaded in compression between the sleeve **130** and one of the abutments, e.g. the abutment **132** remote from the sleeve **133** for connecting each beam **94** to the two arms **87** carrying it.

The use of one or two brackets **85** together with a cursor **76** and together with beams **94** interconnecting respective arms **87** of such brackets **85** is particularly appropriate when the framework **65** of the roof to be lifted has elements distributed along a horizontal line, as can be the case for example along an inferior purlin, at the bottom of a slope of a roof having two or four slopes.

A four-slope roof can thus be lifted solely by means of cursors **76** provided with brackets **85** themselves fitted with interconnecting beams **94** engaging beneath the inferior purlins or beneath the principal rafters, running along them, as shown in FIGS. **8** and **11**.

In contrast, for a two-slope roof, it is preferable to act likewise beneath the principal rafters of the gable walls or beneath the purlins along said principal rafters, and for this purpose, use is made of a link device **99** that accommodates the slope of the roof and that co-operates with a cursor **76**, optionally provided with only one bracket **85** if the device **63** of the invention is located at a corner between two walls, as shown in FIGS. **4** to **7**. An entirely similar mounting can advantageously be used on inside structural walls regardless of whether a two-slope roof or a four-slope roof is to be lifted, in a manner that is not illustrated but that the person skilled in the art will easily be able to transpose from the mounting described below.

The link device **99** can be mounted on the bearing **83** of the cursor **76** in a manner that is identical to a bracket **85** by means of a base **100** provided for this purpose with a clevis **114** that is entirely comparable to the clevis **89**.

The base **100** defines a hinge bearing about an axis **101** perpendicular to the two axes **56**, i.e. a horizontal axis, for a cradle **102** for receiving a rigid truss rafter beam **103** that is rectilinear and extends perpendicularly to the axis **101** and that is disposed along the principal rafter so as to press either against the underside thereof or else against the undersides of the purlins of the framework **65**, where necessary via appropriate wedges, and that is caused to rest on at least two cradles **102** corresponding to two devices **63** of the invention distributed along the gable wall. By way of example, the truss rafter beam **103** may be constituted by an I-section metal girder having one of its flanges, e.g. its top flange received and slidably guided in a direction perpendicular to the axis **101** in a zone of the cradle **102** that is complementary in shape. Advantageously, the truss rafter beam **103** forms a portion of a truss **136** that is preferably adjustable and for which it constitutes a principal rafter that is fitted beneath the framework **65** along the gable wall in removable manner for ensuring continuity in this location of the dynamic belt that is constituted elsewhere by the brackets **85** and the beams **94**. Such an adjustable truss may also be provided along inside structural walls, there preferably being two trusses disposed on either side of each such wall, for the purpose of performing the same functions of distributing load, during lifting, and of providing continuity for the dynamic belt. In a manner that will easily be understood by the person skilled in the art, such a truss **136** is advantageously constituted by an assembly of rectilinear metal bars, comprising two principal rafters such as **103** that are hinged together, and each connected via a device **99** to the cursor **76** of at least one respective device of the invention and at least one preferably-telescopic truss main beam **135** hinged to the two principal rafters in order to allow the shape of the thrust to be matched to the shape of the roof framework **65** and thus ensure that each purlin is supported on the adjustable thrust, where necessary by appropriate wedging devices. The various hinge axes, such as **137**, e.g. defined by devises such as **138**, are mutually parallel and perpendicular to a mean plane (no reference) of the truss **136**, which plane extends substantially parallel to the associated gable wall or inside wall. The principal rafters such as **103** may themselves be telescopic, or they may be cut to the desired length on site, however it is also possible to allow them to project beyond the roof to a greater or lesser extent depending on the dimensions of the roof, if necessary by forming gaps for this purpose in the walls.

A person skilled in the art will readily understand that hinging each cradle **102** about an axis **101** relative to the cursor **76** makes it possible to adapt to any particular structure, and in particular, if necessary, to orient the axis **101** perpendicularly to the plane (unreferenced) of the axes **56**, as shown on the righthand halves of FIGS. **4** and **7** for a device **63** of the invention placed on a gable wall or on an inside structural wall, e.g. in the vicinity of the bridge purlin.

It will be observed that when a plurality of devices of the invention are distributed along a gable wall, for a two-slope roof, or along an internal wall for a roof having two or four slopes, it is not essential to provide a rigid link between the truss rafter beam **103** of the adjustable truss **136** and the cursor **76** of the nearest device **63** of the invention on the corresponding wall. On the contrary, it can be preferable to use a device which, while providing a link between the truss rafter beam **103** and said cursor **76**, allows a small amount of mutual displacement in the vertical direction, in particular, in order to accommodate possible differences of stroke between the cursor **76** or **77**.

Under such conditions, the device **99** which provides a rigid link between the truss rafter beam **103** and the cursor **76** is advantageously replaced by a link device **139** as described below, with reference to FIG. **13**.

This device is designed to be positioned on one or other of the bearings **83** of the cursor **76** in identical manner to the device **99**, and to this end it has a flat base **140** which is vertical when in use, that is provided with a clevis (not visible in FIG. **13** but entirely comparable to the clevis **114** or the clevis **89**) for mounting the device **139** on the corresponding bearing **83** of the cursor **76**. Overall, the device **139** is symmetrical about a vertical plane (not shown) which also constitutes a plane of symmetry for the clevis enabling it to be mounted on the bearing **83** of the cursor **76** and includes the axis **84** of said bearing **83** together with the axis **53**, after the device **139** has been mounted on the cursor **76**, such that a single device **139** can be used equally well to left or to right of a cursor **76**, "left" and "right" being as seen when facing such a cursor.

The base **140** of the device **139** is generally in the form of a rectangular frame, having two vertical uprights **141** disposed symmetrically about the above-mentioned plane of symmetry of the device, and two horizontal cross-members **142**, a top member and a bottom member, rigidly interconnecting the two uprights **141** respectively via their tops and via their bottoms, perpendicularly to said plane of symmetry.

Advantageously, the base **140** is adjusted in the vertical direction relative to the cursor **76** by means analogous to those mentioned with reference to the brackets **85**, such that its top cross-member **142** is at a distance beneath the inferior purlin of the framework **65** of the roof that is to be lifted, compatible with the above-mentioned mutual displacements.

Inside the frame defined in this way by the base **140**, there are rigidly mounted vertical rods **143**, one of which lies in the plane of symmetry of the device **139** and the other two of which are disposed symmetrically on either side of said plane; the rods **143** thus interconnect the two cross-members **142** in rigid manner. A slider **144** is mounted to slide freely vertically on the three rods **143** relative to the base **140**, which slider is secured to a shaft **145** cantilevered out away from the clevis hinging the base **140** on the cursor **76** and itself carrying a cradle **147**, guiding it in relative rotation about a horizontal axis **146** lying in the above-mentioned plane of symmetry of the device **136** with the possibility of limited sliding parallel to said axis, which cradle **147** is entirely analogous to the cradle **102** and co-operates in analogous manner with the truss rafter beam **103**. However, in the example shown in FIG. **13**, it is the bottom flange of the truss rafter beam **103** which is received and guided for sliding in a direction perpendicular to the axis **146**, which direction is also the direction of the truss rafter beam **103**, the flange being received in a zone of complementary shape of the cradle **147**, it being understood that it is still the top flange of the truss rafter beam **103** which, in this example of FIG. **13** as in the example of FIGS. **4** to **7**, bears against the undersides of the purlins of the framework **65** to apply lifting force thereto under drive from the devices **63** of the invention distributed along the gable wall or the inside structural wall, as the case may be.

Such a device **63** may advantageously be used to act on two rafter beams **103** of the adjustable truss **136** where they are hinged together and to the bottom of the ridge purlin, as shown in FIG. **4**.

Under such circumstances, the device **63** of the invention is disposed immediately beneath the ridge purlin, so that its axis **53** intersects the ridge purlin and, as much as possible, so that the plane of symmetry **21** of the wall plate **1** and of the holding tray **42** coincides with the vertical midplane of symmetry thereof, as shown in FIG. **14**.

The cursor **76** (not visible in FIG. **14**) of this device **63** of the invention carries, via its two bearings **83** that are likewise not visible in this figure, a link device **148** comprising a base **149** entirely comparable to the base **142** as to its rectangular frame structure comprising two vertical uprights **150** symmetrically disposed about a midplane of symmetry of the base **149**, including the axis **153** and coinciding with the plane **21** in this case, and two horizontal cross-members **151** perpendicular to said plane, comprising a top cross-member interconnecting the top ends of the uprights **152** and a bottom cross-member interconnecting the bottom ends thereof. Nevertheless, unlike the base **142**, the base **150** has two devises disposed symmetrically about its plane of symmetry for rigid but vertically adjustable linking of the base **156** with the cursor **76** via both bearings **83** thereof simultaneously. The vertical adjustment is such that the top cross-member **151** bears against the underside of the ridge purlin. These two devises are not visible in FIG. **14**, but design thereof comes within the normal attitudes of a person skilled in the art. They are entirely identical to the devises **158** shown in FIG. **15** for another link device **155** between a cursor **76** and a truss rafter beam **103**.

On the opposite side to the two clevises, i.e. remote from the cursor **76**, the base **149** is secured to a plane vertical slab

152 parallel to a plane defined by the axes **56** of the two guide rods **64**, the slab **152** being edged by the two uprights **150** and the two cross-members **151**.

Cantilevered out away from the devises of the base **149** and away from the cursor **76**, the slab **152** is secured to two shafts **153** symmetrically disposed about the midplane of symmetry of the base **149** and situated at the same level in a vertical direction relative to the cross-members **151**, the two shafts **153** serving to mount respective cradles **154** so that they can rotate about horizontal axes **155'** parallel to the midplane of symmetry of the base **149**, about which the two axes **155'** are symmetrically disposed, and so that they can also move in limited translation parallel to said axes **155'**.

Each cradle **154** is generally in the form of a sleeve extending radially relative to the corresponding axis **155'** and receiving and securely but releasably retaining a respective end length of one of the beams **103** constituting the principal rafters of the adjustable truss **136**. The ends may be releasably retained by pins, not shown. The truss rafter beams **103** are thus hinged to each other via their respective hinges about the corresponding axes **155'** of the slab **152**.

Where appropriate, the slab **152** may be capable of limited displacement in the vertical direction relative to the base **149**, e.g. by slidable guidance entirely similar to that of the slide **144** on the rods **143**, relative to the base **140** of the device **139** described with reference to FIG. **13**.

A somewhat similar mount can be used beneath the intermediate purlins, as shown in FIG. **15** which shows a device **63** of the invention mounted on a gable wall or on an inside wall, beneath an intermediate purlin of the framework **65**, and more precisely in a position relative to said intermediate purlin that is identical to the position occupied by the device **63** relative to the ridge purlin, and as described with reference to FIG. **14**.

To provide the connection between the cursor **76** together with the intermediate purlin and the beam **103** forming the principal rafter of the truss **136**, a link device **155** is mounted on the two bearings **83** of the cursor **76**, which link device comprises, in particular, a base **156** completely identical to the base **149** and provided, like that base, on its uprights **157** that are entirely identical to the uprights **150**, with respective devises **158** each connected to a respective one of the bearings **83** of the console **76**, with the possibility to adjust height so that the top cross-member **159** of the base **156** which is entirely identical with the cross-members **151** of the base **149**, bears against the underside of the intermediate purlin under consideration.

A set of vertical rods **160** that are just like the rods **143** of the device **139** described with reference to FIG. **13**, securely interconnecting the two cross-members **159**, the base **156** carries a slider that is not shown but that is just like the slider **144** so that it can slide vertically over a limited distance, which slider itself is secured to a shaft **161** projecting away from the clevises **158** along a horizontal axis **162** situated in the mean plane of symmetry of the base **156**, intersecting the axis **53** and lying in the plane **21** and also, at least approximately, in a longitudinal midplane of the intermediate purlin in question.

This shaft **161** in turn carries a cradle **163'** entirely analogous with the cradle **147** with the possibility of limited sliding along the axis **162** and guided to rotate about the axis **162** relative to the slide, the cradle serving to receive and slidably guide the truss rafter beam **103** via the bottom flange of the I-girder constituting it.

By means of each of the devices **139**, **148**, and **155** described above with reference to FIGS. **13** to **15**, the, or each, cradle **147**, **154**, **163'** is free to move in limited manner both vertically and horizontally, i.e. away from or towards the associated gable wall or inside wall, such that use of an adjustable truss **136** is compatible with the tolerances in the upward stroke of the various cursors **76** and also with the tolerances concerning planeness of the gable or inside wall carrying the devices **63** of the invention. Certain of the link devices **139**, **148**, and **155**, or perhaps only one of them, particularly for the device **148** constituting the common hinge between two truss rafter beams **103** and serving to lift the ridge beam by acting directly thereon, as is the case in the embodiment of said device **148** as described with reference to FIG. **14**, can preferably be associated with means for immobilizing the, or each, corresponding cradle in the vertical direction relative to the corresponding base, such immobilization being performed by wedging or by any other means.

The link devices **139**, **148**, and **155** may be used jointly in association with an adjustable truss **136**, or they may be used separately. In particular, the devices **99** can replace the devices **139** in association with the devices **148** and/or **155**.

It will be observed that when using link devices **139**, **148**, or **155**, it is the bases **149**, **156** thereof that bear against the purlins to lift the framework **65** in association with gable walls or inside walls, while the truss rafter beams **103** do not, in principle, make contact with the framework and serve merely to guarantee continuity of the above-described dynamic belt over gable walls and inside walls.

Provision may also be made to cause the truss rafter beams **103** of the adjustable truss **136** to co-operate directly with the purlins, particularly the intermediate purlins, preferably by ensuring that the hinge between a main beam **135** of the adjustable truss **136** and the truss rafter beam **103** under consideration lies in the vicinity thereof. Advantageously, under such circumstances, it is a device constituting the clevis **138** of the hinge between the truss main beam **135** and the truss rafter beam **103** that also serves to link it with the purlin under consideration, as can be seen in FIGS. **16** and **17** which show two embodiments of such a device, given respectively references **163** and **164**. In each of these FIGS. **16** and **17**, both the truss rafter beam **103** and the truss main beam **135** are shown as being metal I-girders, each having a vertical web and top and bottom flanges, both horizontal for the truss main beam **135** and both inclined relative to the horizontal for the truss rafter beam **103** constituting a principal rafter. Naturally, a person skilled in the art can adapt the above-described dispositions to other embodiments of truss main beam **135** and of principal truss rafter beam **103** without difficulty, and without thereby going beyond the ambit of the present invention.

Reference is made initially to FIG. **16** in which it can be seen that the link device **163** comprises a rigid bush **165** engaged on the truss rafter beam **103** by sliding therealong, and comprising, for this purpose, two mutually parallel flat vertical lateral walls **166** disposed on either side of the truss rafter beam **103** and forming the clevis **138** beneath it, a plane top wall **167** securely interconnecting the two lateral walls **166** and resting on the top flange of the truss rafter beam **103**, and a bottom wall **168** lying against the bottom flange so that the walls **166**, **167**, and **168** define between them a channel **169** in which the truss rafter beam **103** is guided to slide in the length direction without any play other than the clearance necessary for making such sliding possible. Nevertheless, between each of the top and bottom walls **167** and **168** and the corresponding flange of the truss rafter beam **103**, respective shoes such as **170** and **171** are interposed inside the channel **169** for co-operating with respective clamping screws such as **172** passing through the top wall **167** or through the bottom wall **168** to clamp, at will, the corresponding flange of the truss rafter beam **103** against the top or bottom wall by tightening the screw, thereby completely immobilizing the beam inside the channel **168** relative to the bush **165**, in any desired relative position, or, on the contrary, releasing the truss rafter beam **103** and the bush **165** for relative sliding in the length direction of the truss rafter beam **103**.

Beneath the bottom wall **168**, the two lateral walls **166** define the axis **137** by means of a shaft **173** securely connecting them together on said axis **137** and carrying a rectilinear arm **174** extending radially relative to the axis **137** and being capable of rotating about said axis **137**. In a midplane (not referenced) perpendicular to said axis **137**, the arm **174** has a continuous slot **175** which subdivides it into two fingers **176** disposed symmetrically about the plane and each extending radially relative to the axis **137**, as can be seen in FIG. **17** which shows an identical arm **174**. The slot **175** and the fingers **176** are dimensioned so that the web of the girder constituting the truss main beam **137** engages as accurately as possible in the slot **175** between the fingers **176**, and the fingers, when disposed on either side of said web bear as nearly flat as possible against the top and bottom flanges of the girder. Facing holes **177** formed in the two fingers **176** perpendicularly to the mean plane of symmetry thereof receive screws (not shown) passing through corresponding holes appropriately provided for this purpose in the web of the truss main beam **135**, to secure the truss to the arm **174**, with the beam extending radially relative to the axis **137**. The particular radial orientation can be chosen freely as a function of the slope of the roof to be lifted, by pivoting the assembly constituted by the truss main beam **135** and the arm **176** about the axis **137** relative to the bush **165** which is itself secured to the truss rafter beam **103**, it being understood that the truss main beam **135** is, theoretically, horizontal, whatever the slope of the truss rafter beam **103** relative to the horizontal, for matching the slope of the roof.

To immobilize the truss rafter beam **103** relative to the main beam **135** in the desired angular position about the axis **137**, the device **163** is associated with a separate locking device **178** which comprises a bottom slide **179** mounted to slide along the main beam **135** on the top flange thereof, and a top slide **180** mounted to slide along the truss rafter beam **103** via the bottom flange thereof, with a rectilinear strut **181** interconnecting the two slides **179** and **180** and hinged to each of them about a respective axis **182**, **183** parallel to the axis **137**. This locking device **178** disposed inside the acute angle formed by the main beam **135** and the truss rafter beam **103** in association with the axis **137** can be locked by friction between the slides **179** and **180** and the respectively associated flanges of the girders **135** and **103**, or locking can be achieved by a wedging effect applied between each slide **179**, **180** and the flange associated therewith, e.g. by screw-driven shoes, entirely analogous to the shoes **170** and **171**.

The strut **181** may be of constant length, in which case the relative orientation between the main beam **135** and the truss rafter beam **103** is adjusted by rotation about the axis **137** in association with sliding of the slides **179** and **180** along the respective associated flanges. It is also possible for the strut **181** to be of adjustable length between the axes **182** and **183**, e.g. by being implemented in the form of a screw jack, in which case the slides **179** and **180** are locked respectively to the main beam **135** and to the truss rafter beam **103** while the relative orientation thereof about the axis **137** is being adjusted, and said adjustment is performed by adjusting the length of the strut **181**. The implementation of such variants of the device **178** comes within the normal aptitude of the person skilled in the art, and is not described in greater detail.

To support an intermediate purlin (not shown in FIG. **16**), and to apply a lifting force thereto by lifting the adjustable truss **136**, the top wall **167** of the bush **165** carries securely a clevis **184** in a top end zone thereof, taking account of the slope wall **167** and of the truss rafter beam **103** when in position beneath the framework **65** to be lifted. The clevis **184** receives and guides rotatably about an axis **186** parallel to the axis **137**, a shaft **185** lying on the axis and itself secured to the underside of a bracket **187** for bearing against the intermediate purlin vertically against the bottom thereof and horizontally on its side facing down the slope of the roof and of the truss rafter beam **103**.

To this end, the bracket **187** has a flat flange **188** having a free edge at its up-slope end and secured in the vicinity thereof and on its underside to the shaft **185**, while its down-slope edge carries another flange **189** perpendicular to the flange **188** and parallel to the axis **186**, extending upwards from its connection to the flange **188**.

In order to ensure that the flange **188** can be placed horizontally and the flange **189** vertically, to press flat against an intermediate purlin that is assumed to be vertical, or in order to enable them to take up the appropriate orientation so-as to be capable of pressing flat against a purlin that is at some other orientation relative to the horizontal, e.g. at an orientation perpendicular to the truss rafter beam **103**, and in order for this to be possible regardless of the slope of the truss rafter beam **103** and of the roof itself relative to the horizontal, means are provided for adjusting the orientation of the bracket **187** about the axis **186**, relative to the bush **165**, which means are described below.

On the top wall **167** of the bush **165**, these means comprise two rectilinear rods **190** extending radially relative to the axis **186** and parallel to the wall **167**, i.e. in the general direction of the channel **169** and of the truss rafter beam **103**. Given its slope, each of these rods **190** has a top end facing up the slope and secured to the wall **167** via a respective abutment **191** that said wall **167** has secured thereto in the immediate proximity of its bottom edge, i.e. its edge facing down the slope.

A chock **194** has eyelets **193** slidably mounted on each of the rods **190** with the possibility of being locked in any desired adjusted position along the rods **190**, e.g. by means of a respective clamping sleeve **192** engaging the rod **190**. The chock **194** is thus guided to slide relative to the wall **167** of the bush **165** along the rods **190**. Optionally, in a manner not shown in the figures, the chock **190** may also be guided by having a tenon engaged in a groove formed in the top wall **167** of the bush **165** and extending parallel to the rods **190**.

The chock **194** is thus disposed between the bracket **187** and the abutments **191**, i.e. it is offset down-slope relative to the bracket **187**, and it presents to the bracket, i.e. up-slope, a flat **195** parallel to the axis **186** and inclined relative to the wall **167** so as to form an upwardly directed angle relative thereto that is preferable greater than 90°, e.g. being about 135°, which figure is given purely by way of non-limiting example. In a midplane of symmetry that coincides with that of the adjustable truss **136** and that also constitutes a midplane of symmetry for the assembled-together bush **165** and bracket **187**, the flat **195** has a groove **197** in which a tenon **169** secured to the bracket **187** is engaged facing down the slope, projecting from the junction between the two flanges **188** and **189**. On either side of the groove **197**, there is a slot **198** in the chock **194** extending parallel to the flat **195** and receiving a respective stud **199** on the tenon **196** such that said tenon **196** is guided to slide along the slot **198** and can also rotate inside the slot **198**. To this end, the two studs **199** are advantageously circularly cylindrical in shape about a common axis **200** parallel to the axis **186**.

The person skilled in the art will readily understand that by causing the chock **194** to slide along the rods **190**, co-operation between the studs **199** on the tenon **196** and the slots **198** causes the bracket **187** to pivot about the axis **186** relative to the bush **165**. It is within the normal aptitude of the person skilled in the art to shape and dimension the set of elements carried by the top wall **167** of the bush **165** as described above under numerical references **187** to **200** in such a manner that:

- in one limiting position of the chock **194**, in which the eyelets **193** come into abutment against the abutments **191**, the flanges **188** and **189** of the bracket **187** are respectively parallel to the wall **167** and perpendicular thereto, as shown in FIG. **17** given that the device **174** is identical to the device **163** in this respect, thereby enabling the bracket **187** to be fitted against an intermediate purlin that is perpendicular to the slope of the roof, i.e. perpendicular to the truss rafter beam **103**, the studs **199** of the tenon **196** of the bracket **187** then being at the ends of the slots **198** of the chock **194** closest to the wall **167**; and
- in an opposite limiting position of the chock **194**, in which the chock has its flat **195** in the immediate vicinity of the shaft **185**, corresponding to a position of the studs **199** of the tenon **196** of the bracket **187** being immediately adjacent to the ends of the slots **98** furthest from the wall **167**, the flanges **188** and **189** of the bracket **187** then being respectively horizontal and vertical for the steepest slope that can reasonably be expected for the roof, i.e. likewise for the truss rafter beam **103**, relative to the horizontal, it being understood that FIG. **16** shows a position close to this limiting position and corresponding to the shallowest possible value for the slope of the roof, with the flanges **188** and **189** extending respectively horizontally and vertical.

Reference is now made to FIG. **17** which shows a device **164** that is highly analogous to the device **163**, as mentioned above, insofar as all of the elements described with reference to FIG. **16** are to be found again therein identically and with the same numerical references, with the exception of the device **178** that is absent and with the arm **174** being hinged in a different manner about the axis **137** relative to the clevis **138** defined by the lateral walls **166** of the bush **165**.

In this FIG. **17** embodiment, the shaft **173** on the axis **137** is secured to the arm **173** and is guided to rotate about the axis **137** relative to the lateral walls **166** of the bush **165**, and outside the clevis **138** defined by said lateral walls **166** it is secured to a gear wheel **102** permanently meshing with a worm screw **202** carried by the corresponding lateral wall **166** for rotating about an axis **203** parallel to said wall **166**, via a clevis **204**. Outside the clevis **204**, the worm screw **202** is connected via a universal joint **205** to a shaft **206** itself carrying a wheel **207** enabling the worm screw **202** to be rotated at will in either direction about its axis **203** relative to the clevis **204**. Given that the worm screw **202** meshes permanently with the gear wheel **201**, such rotation in one direction or the other causes the arm **174** together with the truss main beam **135** to pivot about the axis **137** relative to the bush **165** and to the truss rafter beam **103**, to open or close the angle between the truss rafter beam **103** and the main beam **135**, thereby enabling the slope of the truss rafter beam **103** to be adjusted relative to the horizontal while keeping the main beam **135** horizontal, so as to match the slope of the truss rafter beam **103** to the slope of the roof. Because transmission via a mutually engaged gear wheel **201** and worm screw **202** is not reversible, the main beam **135** and the truss rafter beam **103** are locked in the relative orientation as adjusted in this way.

The person skilled in the art will readily understand that the above-described embodiment of an adjustable truss **136** and the way in which it co-operates with the framework **65** to be lifted, also described above, merely constitute non-limiting examples of means enabling roof-lifting forces to be distributed amongst the purlins at gable walls, for a roof that has two slopes, or at inside walls, for a roof that has two slopes or four slopes, and also to ensure continuity of the above-described dynamic belt.

In particular, instead of being constituted by I-girders, the truss rafter beams **103** and the truss main beams **135** could be implemented in other ways, e.g. they could be constituted by circular section tubes, in which case the shapes of the cradles, channels, and other components or portions of components that co-operate with them would be adapted accordingly, and without difficulty, by a person skilled in the art. The same could apply to the beams **94**.

It would also be possible to omit applying such a truss beneath the framework **65** to be lifted providing action is taken on gable walls and inside walls to engage each purlin by means of a respective device **63** of the invention, and providing it is possible to synchronize accurately the operation of the various devices **63**. Similarly, under certain circumstances, it will be possible to omit the link beams **94** between the cursors **76** at the bottoms of the slopes of the roof.

A person skilled in the art will also easily understand that a set of horizontal beams totally or partially surrounding the building whose roof is to be lifted, which beams are supported on the cursors **76**, e.g. via devices **99**, could take the place completely or partially of the brackets **85** and the interconnecting beams **94** for constituting the above-described dynamic belt, either when the use of brackets **85** and beams **94** is made impossible by the conditions under which the device of the invention is installed, or else because of a deliberate choice.

Also, certain conditions under which a device **63** of the invention may be installed can make it necessary to use the cursor **77** as shown in FIG. **10** instead of the cursor **76**. Both cursors are identical with respect to suitability for receiving one or two brackets **85** and a device **99** or **139**, but the cursor **77** is also shaped to receive securely but removably, e.g. by mutual engagement held by a retaining pin, special accessories **106** and **107** on its top surface **104** and/or its front face **105** (facing away from the wall **3**) and corresponding respectively to the faces **79** and **80** of the cursor **76**. The accessories **106** and **107** are removable and serve to secure respective elements of the framework, in particular a truss main beam or a principal rafter, respectively, said elements having ends that project out from the wall **3**. The shapes of these accessories **106** and **107**, e.g. engaged in the cursor **77** and retained by retaining pins, may vary widely, as a function of the conditions in which the device is installed, and are not described in further detail, given that they come within the normal aptitudes of a person skilled in the art. The top face **79** of the cursor **76** could also be designed to receive the accessory **106** for receiving a truss main beam. It will be observed that in order to enable a cursor **76** or **77** to receive and carry a truss main beam that does not project far enough from the wall **3**, it is possible to extend the beam by a metal bush positioned on the top face **79** or **104** of the cursor and in turn fixed to an accessory **106** appropriately mounted on said top face **79** or **104**, in a manner that is not shown but that is easily understandable to a person skilled in the art.

Once the cursors **76** or **77** of the devices **63** of the invention have been fitted with the most appropriate means for co-operating with the elements of the framework **65** of the roof to be lifted, i.e. brackets **85** and/or accessories **106**, **107**, and/or devices **99**, **139**, **148**, and **155** associated with adjustable trusses **130**, and after wall plates **1** have been fitted to the wall **3**, either directly or via respective jigs **115**, while ensuring that the axes **19** are as horizontal as possible and then ensuring that the axes **56** are adjusted vertically, and establishing links between the guide rods **64** corresponding to the various devices **63** by means of ties **74** and **75**, and linked between the bracket **85** and the cradles **102**, respectively, via the beams **94** and **103**, with the cursors **76**, **77** in positions that are as low as possible on the guide rods **64**, while naturally being above the devises **29**, the various cursors **76**, **77** are caused to move upwards simultaneously and synchronously along the guide rods **64** by thrust means which are advantageously constituted by hydraulic or electro-mechanical jacks **106** associated with remote control means **111** common to the lifting devices **63** to synchronize lifting of the roof by the various devices **63**.

Each device **63** of the invention thus has a single jack **108** removably mounted on the holding tray **42** by the tapped holes **54** distributed around the notch **50** therein.

More precisely, each jack **108** comprising a cylinder **109** and a coaxial rod **110** has its cylinder **109** engaged in the coinciding notches **50** and **22** of the holding tray **42** and the cradle **8** of the wall plate **1** respectively, and is screwed by means of a flange (not shown) to the top face **44** of the holding tray **42** using the tapped holes **54** therein, thus ensuring that it is positioned on the axis **53**, i.e. that is accurately parallel to the guide rods **64**. Its rod **110**, also disposed in this way along the axis **53**, is then placed to press upwards against the cursor **76** or **77**, via the bottom face thereof, e.g. **78**, to which face the rod **110** may optionally be secured.

It will be observed that it is not necessary for the jacks **108** to have a rod **110** with a stroke that is as large as the height through which it is desired to lift the roof.

If the stroke is less than the lift height, then it is possible initially to lift the roof from a position in which the framework **65** thereof is resting on the walls **3** and bring the roof into an intermediate position **65**, after which the cursors **76** or **77** are locked in place on the rods **64** in temporary manner, e.g. by engaging pins through respective holes (not shown) brought into coincidence. Thereafter the rods **110** of the jacks **108** are lowered and an extender is then interposed between each of them and the corresponding cursor **76** or **77**, the extender being of a height that corresponds to the initial lift distance. Thereafter, after the cursors **76**, **77** have been released to slide along the rods **64** again, the jacks **108** can continue lifting to the desired height, with the above operation being repeated, if necessary. Once the desired height has been reached, the cursors **76** or **77** are locked again relative to the rods **64**, e.g. by pins, as mentioned above, and the jacks **108** can be removed and taken to another site while the wall **3** is built upwards until it reaches the framework **65** of the roof in its new position. Once the walls **3** have been completed in this way, it is possible to dismantle the devices **63** of the invention. In a variant, it is also possible to brace the framework **65** temporarily by means of a temporary structure, e.g. made of metal or of wood, once the desired height has been reached, with the devices **63** of the invention then being immediately dismantled in full before finishing off the wall **3**. The temporary structure can then be dismantled or may be integrated in the extra wall structure **3**.

Where appropriate, it is also possible to obtain retention against downwards motion of the framework **65** automatically in a succession of positions obtained during lifting, by providing co-operation between a rachet device provided on each cursor **76**, **77** and a rack extending parallel to the guide rods **64** and fixed relative thereto, e.g. by being formed directly along one of them, in a manner that is not illustrated but that is easily designed by a person skilled in the art.

It will be observed that an embodiment of the invention has been described in which the guide rods **64** are fixed relative to the sleeves **58** that receive them, whereas the cursors **76**, **77** slide on the guide rods **64**.

The invention can also be implemented by providing for the guide rods **64** to slide relative to the sleeves **58** while being secured to corresponding cursors **76** or **77**. Under such circumstances, the jacks **108** serve no longer to cause the cursors **76**, **77** to slide along the guide rods **64**, but instead to lift simultaneously the cursors and the guide rods, with the guide rods sliding in the sleeves **58** to achieve the desired guidance. Naturally, under such circumstances, the pins **35** need to be removed during lifting operations and subsequently put back into place when the holes provided through the rods **64** coincide with the slots **34** in the devises **29**, whenever it is desired to interrupt lifting, and in particular while the jacks **108** are being raised, and also at the end of lifting while the wall **3** is being raised. A rachet device mounted on the holding tray **42** and co-operating with a rack of the above-indicated type may also be provided for this purpose.

This variant embodiment is not shown, but it comes within the normal aptitude of a person skilled in the art and informed about the above.

There follows a description of another variant of the invention given with reference to FIGS. **18** to **21**. Components common with the above-described device are given the same references.

In FIGS. **18** to **21**, there is shown a wall **3** with a substantially vertical surface **112**, which in this case is the outside surface of the wall, it being understood that the lifting device could also be fixed against an inside surface of the wall.

A lifting device, referenced **300**, is fixed to the wall **3** by thrust means essentially constituted by two base components, i.e. a wall plate **301** and an intermediate support plate **308**. It should be observed that in certain particular applications, e.g. for industrial buildings having a metal framework, the lifting device can be fixed to a post rather than to a wall, in which case it would be necessary to call on an adaptation coming within the normal aptitude of a person skilled in the art for providing such a mounting on a post.

The wall plate **301** can be fixed to the face **112** of the wall **3** either directly by means of bolts, or else indirectly via a jig, as in the above-described embodiment. Nevertheless, in this case, provision is made for direct connection between the wall plate **301** and a tie beam of the wall **3**, i.e. to the top face referenced **212** of said tie beam. To this end, the wall plate **301** has a top bracket **302** that bears against the top face **212** of the wall tie beam, with the front face **303** of said bracket **302** having holes **304** for receiving fixing bolts **304.1** (visible only in FIG. **21**) that are anchored in the face **112** of the wall **3**. In a variant (not shown) the single horizontal portion of the bracket can be replaced by two independent support members whose positions relative to the vertical portion is adjustable, thereby enabling the orientation of the wall plate to be adjusted by mounting the support members on respective horizontal axes perpendicular to said vertical portion: this is particularly advantageous when supporting a sloping tie beam.

The wall plate **301** also has a pair of vertical uprights **305** that extend downwards from the bracket **302**, and which have the particular feature of forming a slideway because of their channel sections with the open faces thereof being outwardly directed. At the bottom of each vertical upright **305** there is provided a bottom support plate which may optionally be bolted to the wall face **112**.

The intermediate support plate **308** is essentially constituted by a front plaque **311** and two horizontal cross-members **312** and **313** whose ends pass inside the vertical uprights **305** for the purpose of guiding said intermediate support plate **308** in vertical sliding. A system of holes and pins associated with the vertical uprights could be provided to define successive heights for the intermediate support plate **308**. Nevertheless, in this case it is preferred to suspend the plate **308**, thereby enabling it to be adjusted more finely before beginning lifting proper of the framework. To this end, the wall plate **301** has a horizontal cross-member **307** on top with a threaded rod **309** suspended from the center thereof and thus extending in a vertical plane of symmetry of the slideway formed by the uprights **305** down to a low end close to the bottom support plates **306**. The top cross-member **312** and the bottom cross-member **313** of the intermediate support plates **308** then have a central bore for passing the threaded rod **309**, and the intermediate plate **308** provides support at the desired height by means of a bottom lock nut **310** that can be seen in FIGS. **18** and **19** only. The front plate **311** has two pairs of bottom brackets **314** each fixed thereto by a respective flange **315**, while the other flange **316** of each bracket projects substantially perpendicularly to the plane of the front plate **311**. Each of the flanges **316** have a hole **317** with all of the holes being aligned on a common axis **19**, it being clear below that this axis is the same as the axis about which the holding tray pivots for connecting the guide means and the controlled thrust means with the wall plate **301**. The top cross-member **312** of the intermediate plate **308** also carries two small hollow bars **321** extending in a direction parallel to that of the slideway formed by the vertical uprights **305**, and disposed symmetrical about the midplane of the intermediate support plate **308**. Each hollow bar **321** has an open oblong slot **322** in its front face for a purpose that is explained below. In a variant (not shown), it would be possible to organize the fastening means **321**, **322** on the back of a front plate **311** of greater height, between the horizontal cross-members **312**, **313** which would then be spaced further apart: this would make it possible to reduce the tilting torque (by lowering the point of support and by increasing the distance between the anchor points in the slideway), thereby avoiding having an opening in the top portion of each bar **321**, since such openings could become clogged with debris.

When mounting on a post, the intermediate support plate **308** should be fitted with a clamping device that forms part of the normal knowledge of the person skilled in the art, e.g. a self-wedging clamp, whose clamping torque increases with increasing load (the load then being locked in all directions by opposing wedges and diamond-headed shoes).

The lifting device **300** also includes a holding tray **342** supporting the guide means **64** for the cursor **76**, which guide means are implemented in this case in the form of two parallel rods, on which the lifting cursor **76** can slide parallel to its own plane, and is brought into contact with the bottom edge of the framework **65**, which edge is represented diagrammatically by a chain-dotted line in FIG. **18**. The bottoms of the rods **64** could be received in sleeves secured to the holding tray **342** as is the case in the embodiment described above, but in this case a variant is provided in which each rod **64** has a bottom portion **323** of smaller diameter, enabling each rod **64** to bear directly against the top face of the holding tray **342**, with said portion opening out from the bottom face of said holding tray for locking purposes, e.g. by means of a wedge **342**, as shown in FIG. **18**. The holding tray **342** shown also has a central notch **352** associated with passing the cylinder **109** of the lifting jack **108**, the rod **110** of said jack being represented merely by its top end shown, in FIG. **18**, bearing against the bottom face of the lifting cursor **76**. In a variant (not shown), the cursor **76** could be constituted by two sleeves sliding on the rods **64** and interconnected by a box that is connected at the bottom to the rod of the thrust jack and that is fitted with a horizontal transverse axis on which there pivots a support plate of adjustable inclination: this is advantageous for industrial, metal-framed buildings, since the support plate can be linked directly, e.g. by bolts, to a horizontal or sloping beam of the framework. It is then advantageous to provide an additional guide plate at the top portion of the beam, co-operating with the vertical rods **64**.

Naturally, in a variant, provision could be made for other types of controlled thrust means, e.g. in the form of a screw jack actuated by a pneumatically-controlled rachet system, with the jack, as shown diagrammatically at **108**' in FIG. **20**, bearing against the center of the top face of the holding tray **342**, in which case the above-mentioned notch **352** becomes pointless. In FIG. **21**, there can be seen holes **354** associated with fixing the jack **108** or **108**' by means of bolts (not shown).

According to an advantageous characteristic of this embodiment of the invention, the lifting device **300** also includes means for adjusting verticality, which means are referenced **325**, and means for adjusting level, which means are referenced **335**. These adjustment means **325** and **335** connect the support means constituted by the wall plate **301** and the intermediate support plate **308** to the common connection means constituted by the support plate **342**.

Means are already provided in the above-described embodiment for adjusting verticality, by tilting about an axis by means of support on a cylindrical cradle. In the present case, the means for adjusting verticality are organized differently, thereby making it possible to considerably simplify and lighten the structure of the device.

The means for adjusting verticality **325**, shown more clearly in the exploded view of FIG. **21**, essentially comprise (dual) verticality adjustment elements **326** and a bush **329** for adjusting verticality. The element **326** for adjusting verticality is constituted by a cylindrical head **327** and a threaded shaft **328**. The cylindrical head **327** is shaped to be received in one of the two associated hollow rods **321** so that the associated threaded shaft **328** passes through the notched opening **322**, projecting from the intermediate support plate **308**. The bush **329** for adjusting verticality comprises a tapped body **330** for screwing onto the threaded shaft **328**, and a back support collar **331** provided at the end of the bush **329**. At its front end, the bush **329** has a shaped end **332**, e.g. in the form of a hexagonal nut, said end thus forming a drive head for turning the bush **329** about its axis. The intermediate plate **308** thus has means **321** for fixing the verticality adjustment means **325** and constituted in this case by the hollow rods **321**. When the assembly is mounted, a pair of elements **326** and associated bushes **329** are available that pass through the holding tray **342** in a substantially horizontal direction, coming out via front openings **333** in said tray, which openings are oblong in a vertical direction so as to accommodate a certain amount of angular movement corresponding to adjusting the verticality of the holding tray **342**. It will be observed that the fixing means **321** are organized to enable the adjustment means **325** to pivot about an axis that is suitable for being placed horizontally and parallel to the surface **112** of the wall **3**.

The level adjusting means **335** likewise comprise a pair of level adjusting elements **336** and level adjusting bushes **339**. In this case, level adjusting element **336** is provided comprising a hinge head **337** surmounted by a threaded shaft **338**. For mounting the holding tray **342** on the support means **301, 308**, the hinge head **337** of each level adjusting element **336** is installed between a pair of brackets **314**, and said head has an opening on an axis **334** for receiving a hinge pin **318**. To facilitate installing or removing said pin **318**, provision is made in this case for a pin head **319** of greater diameter that bears against the outside face of one of the brackets in the corresponding pair of brackets, with the other end of the pin passing through the opposite bracket and receiving a locking pin, and the pin head **319** also being fitted with a drive handle **320** facilitating rapid installation of said hinge pin. Each pair of elements **336** and of bushes **339** for adjusting level passes through the holding tray **342** coming out in the top face thereof via oblong through holes **343**, said holes extending in a direction parallel to the pivot axis **19** defined by the hinge pins **318**. As for the verticality adjustment means, each level adjustment bush **339** has a tapped body **340** for screwing onto the threaded shaft **338**, a support collar **344** at its bottom end, and at its other end a drive head, e.g. a hexagonal head **341**.

In FIGS. **18** to **20**, the verticality adjustment means **325** are also shown as having a support washer **345** coming against the front face of the holding tray **342** and held by a pin or a clip (not shown) associated with the adjustment bush **329**, and bottom and top support spacers **346** and **347** and an end support washer **348** associated with the level adjustment means **335**.

When the assembly is put into place, verticality is adjusted by driving the heads **332** of the verticality adjustment bushes **329**, thereby producing the desired tilting of the holding tray **342** about the axis **19**, and thus producing the desired tilting of the jack **308** or **308'** and of the guide rods **64** supported by said holding tray. This verticality adjustment is represented by arrow **400** in FIG. **19**. It will be observed that during verticality adjustment, the oblong slots **333** do not interfere with the ends of the adjustment means **325**.

Level is adjusted in analogous manner, by acting on one and/or the other of the two drive heads **341** projecting from the associated oblong holes **343**, with this action seeking to cause one or both of the bushes **339** to rotate on being driven so as to vary the level of the holding tray **342**, as represented by arrows **401** in FIG. **18**. Even if the support face **312** against the wall **3** is not accurately horizontal, this ensures that lack of horizontally can be accommodated by the adjustment means **335**, thereby guaranteeing that the top support face of the holding tray **342** is accurately horizontal, and thus that the guide rods **64** are accurately vertical, as is the main axis of the controlled jack **108** or **108'**. As will have been observed, the intermediate support plate **308** has means **314**, in this case in the form of brackets, for fixing the level adjustment means **335**. In addition, these fixing means **314** are organized so as to allow the level adjustment means **335** to pivot about the axis **19** which is suitable for being disposed horizontally and parallel to the surface **112** of the wall **3**. It will also be observed that the oblong through openings **343** allow the holding tray **342** to move angularly while level is being adjusted.

The invention is not limited to the embodiment described above, but on the contrary it extends to any variant that uses equivalent means to reproduce the essential characteristics specified above.

In particular, the lifting device of the invention could be used not only for lifting the framework of an existing building, but also lifting the framework of a building that is being built, once upright stabilized and braced posts have been put into place. The device then makes it possible to keep the framework at an intermediate position by means of a wedging system within the normal competence of a person skilled in the art: it is thus possible by raising the connection and support means one level on each occasion, to envisage lifting the framework fully starting from a low height (e.g. 2 meters above the ground) all the way to its final position, thus making it possible to assemble the framework at ground level, thereby receiving a considerable saving in time and a considerable reduction in danger for personnel working on the building site.

Naturally, the person skilled in the art will readily understand that other various implementations of the invention can also be selected, e.g. by adopting the above-described dispositions in association with lifting a framework **65** carrying a roof, but for the case of lifting or lowering a framework carrying a floor.

What is claimed is:

1. A device for lifting a framework, and where appropriate a portion of a building resting on said framework, in particular a roof, relative to underlying walls, the device being intended for use with a plurality of such devices distributed around the framework, the device comprising:

support means for being fixed to a substantially vertical surface of a wall, in particular an outside surface thereof;

a cursor for being placed substantially vertically above the support means and for co-operating with an element of the framework resting thereon;

guide means for guiding the cursor in translation relative to the support means, in a direction that is capable of being oriented substantially vertically; and

controlled thrust means interposed functionally between the cursor and the support means in a direction that is suitable for being oriented substantially vertically,

wherein the support means include a wall plate common to the guide means and to the controlled thrust means, and common connection means for connecting the guide means and the controlled thrust means with the wall plate, ensuring identical orientation therefor.

2. A device according to claim **1**, wherein the connection means include means for adjusting said identical orientation.

3. A device according to claim **2**, wherein the connection means include a holding tray for holding the guide means and the controlled thrust means in an identical orientation, and hinge means for hinging the holding tray relative to the wall plate about an axis suitable for being disposed substantially horizontally to said surface.

4. A device according to claim **3**, wherein the connection means further include temporary immobilization means for immobilizing the holding tray relative to the wall plate within a determined range of relative angular positions about said axis.

5. A device according to claim **1**, wherein the support means include an intermediate jig for fixing the wall plate to said surface, and for being fixed to said surface and for removably receiving the wall plate in a determined relative position.

6. A device according to claim **5**, wherein the jig is suitable for being fixed to said surface in at least one location that is offset from the wall plate occupying said determined relative position.

7. A device according to claim **1**, wherein the controlled thrust means are selected from a group comprising hydraulic jacks and electromechanical jacks, associated with remote control means in common with other lifting devices in order to synchronize a set of lifting devices.

8. A device according to claim **1**, wherein the controlled thrust means are removable independently of the guide means.

9. A device according to **1**, including means independent of the thrust means for temporarily immobilizing the cursor in at least one lift position that is determined relative to the common connection means.

10. A device according to claim **1**, wherein the guide means include at least one guide rod disposed along said direction and guided in translation therealong relative to the common connection means, and in that the cursor is rigidly secured to said at least one guide rod.

11. A device according to claim **10**, including means independent of the thrust means for temporarily immobilizing the cursor in at least one lift position that is determined relative to the common connection means, and wherein the means for temporarily immobilizing the cursor **(76, 77)** include means for temporarily immobilizing the at least one guide rod, against translation in said direction relative to the common connection means.

12. A device according to claim **1**, wherein the guide means include at least one guide rod disposed along said direction and immobilized against translation therealong relative to the common guide means, and in that the cursor is mounted to move in translation along said direction on said at least one guide rod.

13. A device according to claim **12**, including means independent of the thrust means for temporarily immobilizing the cursor in at least one lift position that is determined relative to the common connection means, and wherein the means for temporarily immobilizing the cursor include means for temporarily immobilizing the cursor against translation along said direction relative to the at least one guide rod.

14. A device according to claim **13**, wherein the guide rod is secured to a link box at the end thereof, relative to the cursor, that is remote from the common connection means, and at a distance from the common connection means which is compatible with a predetermined maximum lifting stroke for the roof, the link box providing links with ties for connection to the link box of at least one other lifting device.

15. A device according to claim **1**, wherein the cursor includes mechanical link means for linking with the cursor of at least one other lifting device.

16. A device according to claim **15**, wherein the cursor carries at least one cantilevered-out arm perpendicular to said orientation and is suitable for being placed in line with the arm of the cursor of another lifting device in an alignment that is substantially horizontal and substantially parallel to said surface, and rigidly connected to said other arm by a rectilinear beam disposed along said substantially horizontal alignment.

17. A device according to claim **15**, wherein the cursor carries a link device for linking with a truss, in particular an adjustable truss, suitable for being placed beneath the framework over a gable wall or a structural inside wall, and for being connected via a similar link device, to the cursor of at least one other lifting device.

18. A device according to claim **15**, wherein the cursor includes level adjustment means for adjusting the level of said at least one arm and/or of said link device in said direction.

19. A device according to claim **15**, wherein the cursor includes orientation adjusting means for adjusting the orientation of said at least one arm and/or of said link device about an axis oriented along said direction.

20. A device according to claim **1**, wherein the cursor includes means for adapting to the shape of said element of the framework.

21. A device according to claim **1**, further including

adjustment means for adjusting verticality along said identical orientation and adjustment means for adjusting, said means for adjusting verticality and level connecting the support means to the common connection means.

22. A device according to claim **21**, wherein the support means include an intermediate support plate mounted to slide along a substantially vertical direction in a slideway secured to the wall plate, said intermediate plate having means for fixing to the adjustment means for adjusting verticality and for adjusting level.

23. A device according to claim **22**, wherein the intermediate support plate is suspended by a threaded rod from a cross-member of the wall plate so as to enable the height of said intermediate support plate to be adjusted, and the wall plate has at its top a bracket to enable said wall plate to be supported directly on a wall tie beam.

24. A device according to claim **22**, wherein the fixing means are organized to allow the adjustment means to pivot about an axis suitable for being disposed horizontally and parallel to the surface of the wall.

25. A device according to claim **21**, wherein the common connection means include a holding tray on which the guide means and the controlled thrust means are supported.

26. A device according to claim **25**, wherein the holding tray has the adjustment means for adjusting verticality and for adjusting level passing therethrough, and has associated through oblong openings allowing the angular displacements that correspond to said adjustments of verticality and of level.

27. A device according to claim **26**, wherein the adjustment means for adjusting verticality and for adjusting level comprise respective threaded shafts on which respective adjustment bushes are screwed.

28. A device according to claim **24**, wherein the threaded shaft of the verticality adjustment means is secured to a cylindrical head received in a hollow bar forming the associated fixing means of the intermediate support plate.

29. A device according to claim **24**, wherein the threaded shaft of the level adjustment means is secured to a hinge head connected in hinged manner to the intermediate support plate by a hinge pin passing through brackets forming the associated fixing means of said intermediate support plate.

30. A device according to claim **27**, wherein each adjustment bush has an end head passing through one of the oblong openings and forming a drive member for performing the corresponding adjustments.

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